

POST-HARVEST PROFILE OF SUNFLOWER



GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE

(DEPARTMENT OF AGRICULTURE & COOPERATION)

DIRECTORATE OF MARKETING & INSPECTION

BRANCH HEAD OFFICE

NAGPUR

MRPC-70

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POST-HARVEST PROFILE OF SUNFLOWER

CONTENTS

	Page No.
1.0 INTRODUCTION	4-5
1.1 Origin	4
1.2 Importance	5
2.0 PRODUCTION	6-9
2.1 Major producing countries in the world	6
2.2 Major producing states in India	7
2.3 Zone-wise major commercial varieties	9
3.0 POST-HARVEST MANAGEMENT	10-36
3.1 Post-harvest losses	10
3.2 Harvesting care	10
3.3 Post-harvest equipments	11
3.4 Grading	14
3.4.1 Grade specifications	14
3.4.2 Adulterants and toxins	25
3.4.3 Grading at producers' level and under Agmark	25
3.5 Packaging	26
3.6 Transportation	27
3.7 Storage	29
3.7.1 Major storage pests and their control measures	31
3.7.2 Storage structures	32
3.7.3 Storage facilities	33
i) Producers' storage	
ii) Rural godowns	
iii) Mandi godowns	
iv) Central Warehousing Corporation	
v) State Warehousing Corporations	
vi) Co-operatives	
3.7.4 Pledge finance system	36

Page No.

4.0	MARKETING PRACTICES AND CONSTRAINTS	37-45
4.1	Assembling (Major assembling markets)	37
4.1.1	Arrivals	38
4.1.2	Despatches	39
4.2	Distribution	39
4.2.1	Inter-state movement	39
4.3	Export and import	40
4.3.1	Sanitary and Phyto-Sanitary requirements	43
4.3.2	Export procedures	44
4.4	Marketing constraints	45
5.0	MARKETING CHANNELS, COSTS AND MARGINS	46-48
5.1	Marketing channels	46
5.2	Marketing costs and margins	48
6.0	MARKETING INFORMATION AND EXTENSION	50-53
7.0	ALTERNATIVE SYSTEMS OF MARKETING	54-56
7.1	Direct marketing	54
7.2	Contract marketing	55
7.3	Co-operative marketing	55
7.4	Forward and future markets	56
8.0	INSTITUTIONAL FACILITIES	58-63
8.1	Marketing related schemes of Govt./Public Sector	58
8.2	Institutional credit facilities	61
8.3	Organisations / agencies providing marketing services	63
9.0	UTILIZATION	66-68
9.1	Processing	66
9.2	Uses	68
10.0	DO'S AND DON'TS	70-71
11.0	REFERENCES	72-73

1.0 INTRODUCTION

Sunflower (*Helianthus annuus* L.) is an important oilseed crop in India popularly known as “Surajmukhi.” The name “Helianthus” is derived from ‘Helios’ meaning ‘sun’ and ‘anthos’ meaning ‘flower’. It is known as sunflower as it follows the sun by day, always turning towards its direct rays. It is one of the fastest growing



oilseed crops in India. In early 1970s, only about 0.1 million hectares were under sunflower cultivation, however by 2002-03, it had gone upto 1.63 million hectares. In India, it was used mainly as ornamental crop but in recent past it became an important source of edible and nutritious oil.

Sunflower is a major source of vegetable oil in the world. It is used for a variety of cooking purposes. Sunflower seed contains about 48 – 53 percent edible oil. The sunflower oil is considered premium compared to other

vegetable oil as it is light yellow in colour, high level of linoleic acid and absence of linolenic acid, possesses good flavour and high smoke point. Sunflower oil is a rich source (64 percent) of linoleic acid which is good for heart patients. Linoleic acid helps in washing out cholesterol deposition in the coronary arteries of the heart. The oil is also used for manufacturing hydrogenated oil.



Sunflower is also a source of lecithin, tocopherols and furfural. It is used as nutritious meal for birds and animals. It is also used in the preparation of cosmetics and pharmaceuticals. The composition of sunflower seed is given in Table No.1.

Table No. 1: Composition of sunflower seed

<u>Constituent</u>	<u>Composition (Percent)</u>
1.) Hull	21 - 27
2.) Oil	48 - 53
3.) Protein	14 - 19
4.) Soluble sugar	7 - 9
5.) Crude fibre	16 - 27
6.) Ash	2 - 3

Source: Quality and Utility of Oilseeds, by Nagraj, G., Directorate of Oilseeds Research (Indian Council of Agricultural Research), Hyderabad, 1995.

1.1 Origin:

Sunflower is probably originated in Southern United States and Mexico from where it was introduced into Europe and later into former USSR. Majority of the present day varieties

grown all over the world is originated from former USSR. In India, sunflower as an oilseed crop introduced in 1969.

Botanical Description:

Sunflower (*Helianthus annuus* L.) belongs to the family Compositae. It is an annual, erect and herbaceous plant with leaves simple, alternate with stout petioles and lanceolate in shape. Leaves are rough on both surfaces. A single head produces 350 to 2000 seeds. Seeds are pointed at base and round at end. Colour of the seed varies from black to white but brown, striped or, mottled seed may also occur.

1.2 Importance:

Sunflower seeds are one of the most nutritious and healthy foods. Sunflower is described as “**drenched with sun-vitality**” because the head follows the sun, ending up facing the west “**to absorb the few last rays of the dying sun**”.

India is one of the largest producers of oilseed crop in the world. Oilseeds occupy an important position in the Indian agricultural economy. Our country accounted for 4.77 percent (1250 thousand MT) of total world production of sunflower in 2004. Due to source of high quality edible oil, sunflower oil is used as cooking oil in different recipes. Its importance increases as sunflower oil is considered as a heart friendly oil.

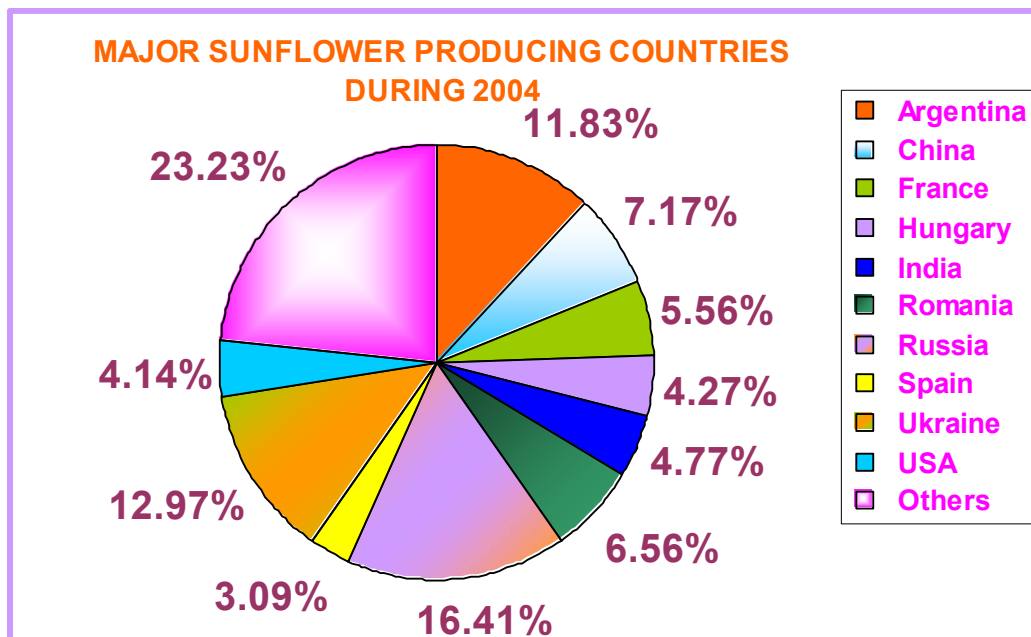
Besides oil, almost every part of sunflower has commercial value. It is used in the manufacturing paints, resins, plastics, soap, cosmetics and many other industrial products.

Sunflower as an oilseed is a newly introduced crop in the country. This crop has gained importance due to its short duration of maturity, containing of excellent quality of oil, photo-insensitivity, wide adaptability into different kinds of cropping pattern, high-energy hull and drought tolerance. It is a short duration crop and can be incorporated in different type of cropping pattern. Sunflower is grown as inter cropping with crops such as Groundnut, Pigeonpea, Castor, Soybean and Urd bean. Since it is a photo-insensitive crop, it can be grown throughout the year. Oil cake is rich in high quality protein (40 – 44 percent) and used as cattle and poultry feed. This crop is considered valuable from economic as well as ornamental point of view.

2.0 PRODUCTION

2.1 Major producing countries in the world:

According to FAO statistics, it has been observed that sunflower was grown in about 21.39 million hectares of land with production of 26.21 million tonnes during 2004 in the world. Russia was the largest producer of sunflower occupying 21.03



percent of area with 16.41 percent of production in the world during the same period. The other major Sunflower producing countries were Ukraine (12.97 percent), Argentina (11.83 percent), China (7.17 percent), Romania (6.56 percent), France (5.56 percent), India (4.77 percent), Hungary (4.27 percent), USA (4.14 percent) and Spain (3.09 percent) during the same period.

Area and production of sunflower during 2002 to 2004 in major growing countries of the world are given below:

Table No. 2: Area and production of sunflower in major producing countries

**Area: '000 Hectares
Production: '000 Tonnes**

Name of the Country	Area				Production			
	2002	2003	2004	Percent to world	2002	2003	2004	Percent to world
Argentina	2015.00	2324.00	1822.00	8.51	3843.00	3714.00	3100.00	11.83
China	1130.90	1150.00	1170.00	5.47	1946.00	1800.00	1880.00	7.17
France	614.59	693.99	616.00	2.88	1493.00	1505.00	1456.00	5.56
Hungary	418.02	507.00	479.00	2.24	777.00	992.00	1119.00	4.27
India	1638.40	2020.00	2070.00	9.68	902.00	1086.00	1250.00	4.77
Romania	906.20	1153.34	996.80	4.66	1003.00	1506.00	1720.00	6.56
Russia	3782.41	4874.29	4500.00	21.03	3684.00	4871.00	4300.00	16.41
Spain	753.90	790.30	749.50	3.50	757.00	769.00	811.00	3.09
Ukraine	2720.00	3810.00	3320.00	15.52	3271.00	4254.00	3400.00	12.97
USA	882.22	889.10	720.35	3.37	1129.00	1209.00	1086.00	4.14
Others	4533.3	5143.93	4950.40	23.14	5675.00	6050.43	6086.00	23.23
World	19394.94	23355.95	21394.05	100.00	24480.00	27756.43	26208.00	100.00

Source: Website www.fao.org

2.2 Major producing states in India:

Sunflower is one the fastest growing oilseed crops in India. It occupies fourth place among oilseed crops in terms of acreage and production. Even though the commercial production of sunflower began in early seventies with a meagre area of 15 thousand hectares, it had gone upto 1.63 million hectares of area with a production of 0.91 million tonnes in the year 2002-03.

Karnataka, Andhra Pradesh and Maharashtra accounted for 45.05 percent, 30.77 percent and 16.48 percent production covering an area of 53.99 percent, 25.77 percent and 17.18 percent respectively during the year 2002-03 in the country.

Area and production of sunflower in major producing states of India during 2001-2002 and 2002-2003 are given in Table No. 3.

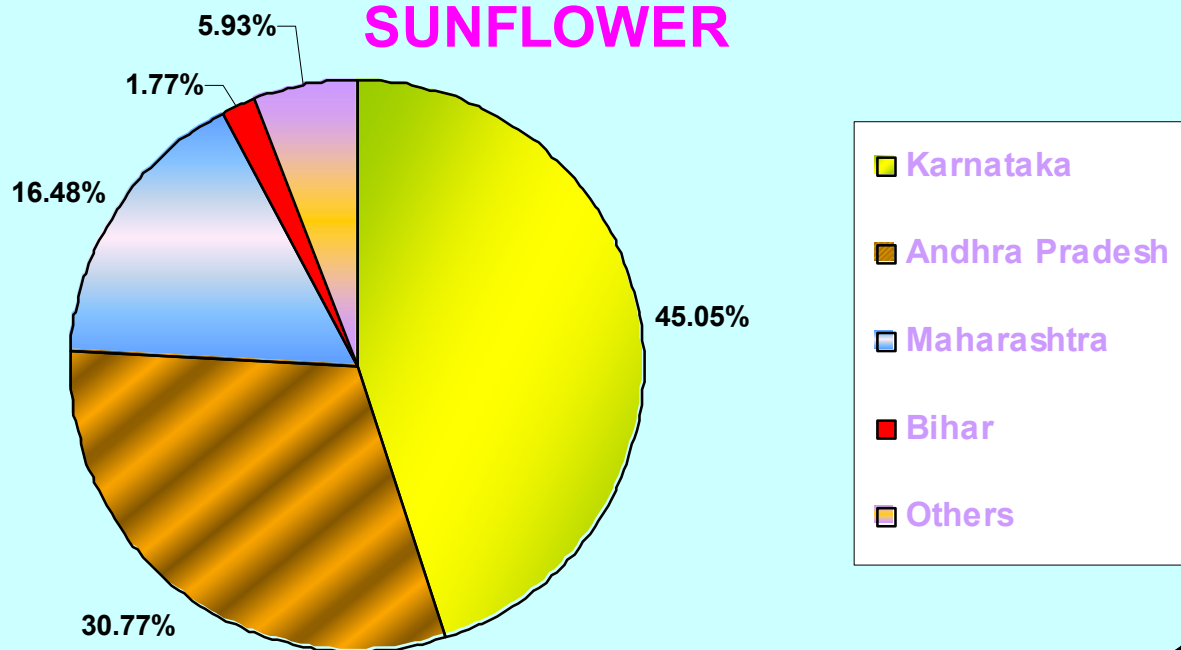
Table No. 3: Area and production of sunflower in major producing states

Area: Million Hectares
Production: Million Tonnes

State	Area			Production		
	2001-2002	2002-2003	Percent to Total Area	2001 - 2002	2002-2003	Percent to Total Production
Karnataka	0.580	0.880	53.99	0.260	0.410	45.05
Andhra Pradesh	0.270	0.420	25.77	0.220	0.280	30.77
Maharashtra	0.270	0.280	17.18	0.130	0.150	16.48
Bihar	0.010	0.013	0.80	0.010	0.016	1.77
Others	0.050	0.037	2.26	0.060	0.054	5.93
All India	1.180	1.630	100.00	0.680	0.910	100.00

Source: Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India.

STATEWISE PRODUCTION OF SUNFLOWER



2.3 Zone-wise major commercial varieties:

Table No. 4: Hybrids/ varieties of sunflower suitable for different zones in India

Zone	State	Name of the hybrids	Name of the varieties
North Zone	Punjab, Haryana	KBSH-1, Jwalamukhi, Sungene-85, PAC-36, PSFH-67	Morden
Western Zone	Gujarat	KBSH-1, Jwalamukhi, Sungene-85, PAC-36, PAC-1091, MLSFH-47	GAUSUF-15, Morden TNAUSUF-7
Southern Zone	Andhara Pradesh, Tamil Nadu, Karnataka	MSFH-8, KBSH-1, MSFH-17, Jwalamukhi, Sungene-85, PAC-36, PAC-1091, MLSFH-47, TCSH-1, BSH-1, DSH-1, APSH-11, KBSH-41, KBSH-42	Morden, TNAUSUF-7, CO-1, CO-2
Central Zone	Maharashtra	MSFH-8, KBSH-1, MSFH-17, LSH-1, LSH-3, PKVSH-27, Sungene-85, PAC-36, PAC-1091, MLSFH-47	Morden, TNAUSUF-7, Surya, SS -56, LS-11
Other States		KBSH-1, Jwalamukhi, Sungene-85, PAC-36, PAC-1091	Morden, TNAUSUF-7

Source: Sunflower package of practices for increasing production, Directorate of Oilseeds Research (ICAR), Hyderabad.

3.0 POST- HARVEST MANAGEMENT

3.1 Post-harvest losses:

Post-harvest losses occur at different stages viz. harvesting, threshing, winnowing, transportation, packaging, storage and processing.

To avoid post-harvest losses, following preventive measures should be considered:

- Harvest timely to reduce losses.
- Adopt proper method of harvesting.
- Adopt modern mechanical methods to avoid the losses in threshing and winnowing.
- Use improved techniques of processing.
- Adopt the grading to get better price.
- Use good packaging materials for storage and transportation.
- Use proper techniques in storage.
- Moisture content of the seed should be less than 9.5 percent for storage.
- Adopt proper pest control measures during storage.
- Adopt timely and proper handling while loading and unloading.
- Avoid use of hooks during handling.



3.2 Harvesting care:

Losses in the field occur at the time of harvesting due to untimely harvest, poor agricultural operations, careless handling, birds, rodents, bad weather conditions like heavy rainfall, hailstorm, etc. During harvesting, proper care should be taken to avoid quantitative and qualitative losses.

Following care should be taken during harvesting:

- ✓ Sunflower should be harvested when the plant attains physiological maturity i.e. when the back of the head turns from green to lemon yellow colour and the bottom leaves starts drying and withering.
- ✓ At physiological maturity, the seed attains maximum weight and oil concentration and harvesting at this stage, results in highest seed and oil yield.
- ✓ 10 percent of heads should turn brown and florets attached to the tip of the seeds drop off naturally.



- ✓ Delay in harvesting causes reduction in seed yield due to lodging of plants and more damage due to birds, rodents and termite attack.
- ✓ Harvesting should be done by adopting proper method.
- ✓ Chemical defoliation or, dessication using DIQUAT, magnesium chlorate or, dipyridyl phosphate should be used to accelerate drying of standing crops.
- ✓ Mechanical thresher should be used to separate seed from flower which is labour saving and economical.
- ✓ Avoid harvesting during adverse weather conditions i.e. rains and overcast weather.



Bird damage management:

Bird damage is a serious problem in sunflower cultivation. Sunflower crop is damaged by birds during the period from seed filling to harvesting. The rose-ringed Para keets (*Pesittacula krameri*) are major bird pests of sunflower causing 10 – 40 percent damage and in isolated area it may cause damage more than 90 percent. Parrots invade the crop in flocks and inflict heavy damage and known to waste much more than what they eat.

Sunflower cultivation should be done in large continuous blocks as parrots create serious problems in isolated areas. Bird scaring like tying of bright reflector ribbons above the crop should be used particularly in the morning and evening hours.

3.3 Post-Harvest equipments:

The following implements are developed by Central Institute of Agricultural Engineering (C.I.A.E), Bhopal for sunflower:

1. Phule Sunflower Thresher

Specifications

Dimensions (l×w×h),m	1.17x1.05x0.66
Weight, kg	42
Threshing wheel dia, mm	635
No. of spokes	50
Power source	One person for drive

Performance results

Cylinder speed, rev./min	166
Broken grain, per cent	Nil
Total grain losses, per cent	3.41
Threshing efficiency, percent	100
Cleaning efficiency, per cent	95
Output capacity, Kg/h	40 (with 4 persons)
Labour requ., man-h/q	10



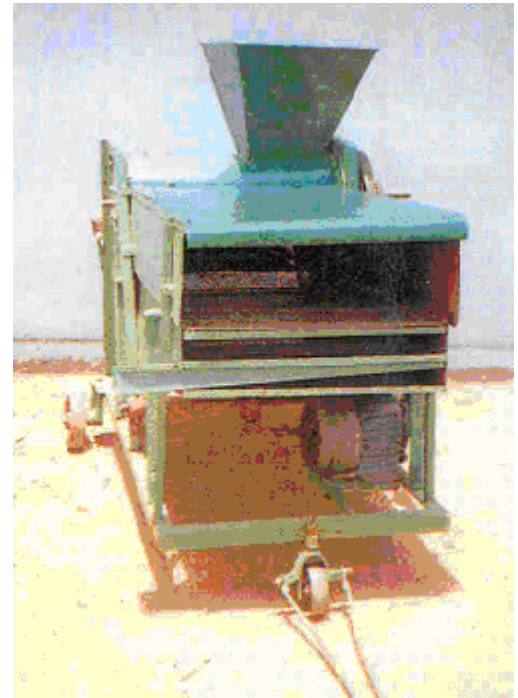
2. APAU Sunflower Thresher

Specifications

Dimensions (l x w x h), m	1.75 x 1.48 x 1.10
Weight, kg	300
Cylinder size, mm	300 dia x 740
Blower	Centrifugal, 340 mm dia One No.
No. of sieves	3
Power source	5 hp electric motor or diesel engine

Performance results

Cylinder speed, rev./min	440
Total grain losses, per cent	1.5
Threshing efficiency, percent	99
Cleaning efficiency, per cent	98
Output capacity, Kg/h	200
Labour requit., man-h/q	1.5



3. PAU Axial Flow Sunflower Thresher

Specifications

Dimensions (l x w x h), m	3.23 x 2.25 x 1.39
Weight, kg	600
Cylinder size, mm	650 dia x 1500
Bar size, mm	1250 x 50 x 10 Flat 6 Nos.
Blower	Centrifugal, One No., 280 mm dia x 750 mm width
Power source	20-30 hp tractor or 7.5 hp motor

Performance results

Cylinder speed, rev./min	300-350
Total grain losses, per cent	0.65-2.94
Threshing efficiency, percent	100
Cleaning efficiency, per cent	90
Output capacity, Kg/h	600-900
Fuel consumption, l/h	2.5
Labour requit., man-h/q	0.6



4. CIAE High Capacity Multicrop Thresher

Specifications

Dimensions (l x w x h), m	3.42 X 2.43 X 2.33
Weight, kg	1200
Cylinder size, mm	700 dia x 1100
Beater size	40X10X180mm flats, 112 Nos.
Blowers	Aspirator type, 600mm.dia, 4 bladed.3 Nos.
Power source	20 hp electric motor or 35 hp tractor pto

Performance results

Cylinder speed, rev./min	8.4
Broken grain, per cent	3.1

Total grain losses, per cent 3.64

Threshing efficiency 99.8 percent

Cleaning efficiency, per cent 93.4

Output capacity, Kg/h 533

Labour requit., man-h/q 0.2-0.6



5. Sunflower Seed Sheller

Specifications

Dimensions (l x w x h), m	2.8x2.0x1
Weight, kg	130
Disc dia, mm	230
No. of discs	Two
Blowers	Centrifugal, One No.
Power source	3 hp electric motor

Performance results

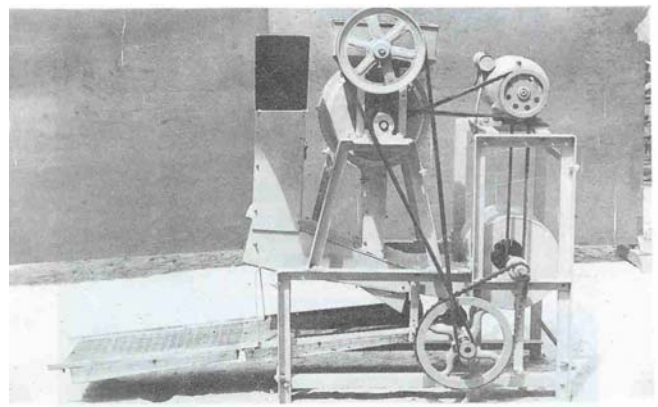
Disc speed, rev./min 3400

Shelling efficiency 90 percent

Separation efficiency, per cent 96

Output capacity, Kg/h 100

Labour requit., man-h/q 1.4



Source: Central Institute of Agricultural Engineering (C.I.A.E.), Bhopal

3.4 Grading:

Grading means the sorting of the homogenous lots of the produce according to the fixed grade standards. Produce is graded in accordance with the various quality factors. The grading of sunflower is beneficial to the farmers, traders as well as to the consumers. Grading of the produce before sale enables farmers to get better price for their produce, whereas grading helps the consumers to get standard quality produce at fair price. After grading, it is easier for the consumer to compare the prices of different qualities of a produce in the market. Grading also reduces the cost of marketing.

In the market, the sale is generally done on the basis of visual inspection of sample and with local commercial name. Buyers offer price on the visual examination of whole lot considering the quality factors like size, colour of the grains, moisture content, refraction and admixture with other varieties. In order to ensure remunerative price to the farmers as well as to gain the confidence of consumer, the sunflower should be graded systematically.

3.4.1 Grade specifications:

i) Grading under AGMARK:

The Agricultural Produce (Grading and Marking) Act, 1937 was enacted to maintain the quality of agricultural produce in India. The Act authorizes the Central Government to frame rules related to the fixing of grade standards and the procedure to be adopted to grade the agricultural commodities included in the schedules. In accordance with this Act, specifications have been drawn up for sunflower considering various quality factors.

The grade standards specified for sunflower seeds and oils are notified by the Directorate of Marketing and Inspection are as follow:

1] Grade specification and definition of quality of sunflower seeds

A) Special requirements:

Grade Designation	Per cent by weight (Maximum)				
	Foreign matter	Damaged seeds	Immature, shrivelled and dead seeds	Weevilled seeds	Moisture content
(1)	(2)	(3)	(4)	(5)	(6)
I	2.0	2.0	10.0	0.5	5.0
II	4.0	4.0	15.0	1.0	5.0
III	6.0	6.0	25.0	1.0	5.0

B) General requirements:

The sunflower seeds shall:

- (a) be obtained from the plant botanically known as *Helianthus annuus* Linn;
- (b) be well developed, mature, clean, dry, free from dirt, obnoxious smell, deleterious substances infestation and rodent contamination except to the extent provide under special characteristics;
- (c) be reasonable uniform in shape, size and colour ;
- (d) not show any visible sign of mould attack.

C) Definitions:

- 1. **Foreign matter:** shall be stones, lumps of earth, straw, chaff, stems, any other edible or non-edible seeds of any other foreign material.
- 2. **Damaged seeds:** shall be the seeds which are internally damaged or discoloured or broken, materially affecting the quality.
- 3. **Immature, shrivelled and dead seeds:** shall be the seeds not properly developed and/or shrunken. Dead seeds shall be those seeds which can easily be crushed, if crushed between two fingers.
- 4. **Weevilled seeds:** shall be those seeds which are wholly or partly bored or eaten by the weevils.

Source: www.agmarknet.nic.in

II] Grade specification and definition of quality of sunflower seed oil

A) Special requirements:

Grade Designation	Moisture and insoluble impurities percent by weight (not more than)	Colour on Lovibond scale* in 1" cell expressed in Y + 5R (not deeper than)	Specific gravity at 30°/ 30 °C	Refractive Index at 40 °C	Saponification value	Iodine value (Wij's method)	Unsaponifiable matter percent by weight (not more than)	Acid value (not more than)	Flash point in Pensky-Martens (Closed cup) method in °C (not less than)
1	2	3	4	5	6	7	8	9	10
Refined	0.10	5	0.913 to 0.918	1.4640 to 1.4800	188 to 194	100 to 140	1.5	0.5	250
Grade-I	0.25	20	0.913 to 0.918	1.4640 to 1.4800	188 to 194	100 to 140	1.5	3.0	--

B) General Requirements:

The oil shall have acceptable taste and odour. The oil shall be clear and free from turbidity when a filtered sample is kept at 30°C for 24 hrs. The oil shall also be free from rancidity, adulterants, sediments, suspended and foreign matters, mineral oil, separated water and added colouring and flavouring substances and obnoxious odour. The oil may contain permitted antioxidants not exceeding in concentration as specified under Prevention of Food Adulteration Rules, 1955. The oil shall be clear, free from rancidity, admixture of other oil or substances, mineral oil, suspended matter, sediments, separated water and free from added colouring and flavouring substances and obnoxious odour. The oil may contain permitted antioxidants not exceeding in concentration specified under Prevention of Food Adulteration Rules, 1955.

C) Description:

Sunflower seed oil shall be obtained either by a process of expressing sound and clean mature sunflower seeds of the plant *Helianthus annuus* Linn. Family Compositae or by a process of solvent extraction** of good quality sunflower seed oil-cake or from sound and clean mature seed of sunflower (*Helianthus annuus*). The oil shall be deacidified with alkali and refining by physical refining and/or by miscella process followed by bleaching with bleaching earth and or activated carbon and deodorisation by steam. No other chemical agent shall be used. Sunflower seed oil shall be obtained by a process of expression of sound, clean and mature sunflower seeds (*Helianthus annuus* Linn fam. Compositae).

Note : * In the absence of Lovibond Tintometer, the colour of the oil shall be matched against standard colour comparators.

**In case of solvent extracted oil, the containers of oil, shall be marked "SOLVENT EXTRACTED"

Source: www.agmarknet.nic.in

ii) NAFED specification for Procurement:

NAFED is the nodal agency of the Government of India for procuring sunflower in different states under the Price support scheme (PSS). The concerned State Co-operative Marketing Federations are the procuring agents for NAFED. Only one grade i.e. Fair Average Quality (FAQ) is prescribed every season for procurement of oilseeds including sunflower. All the purchases under the PSS by NAFED are made in accordance with this specification.

Grade specifications of sunflower seed (Price support operations during 2004-2005 marketing season)

Sl. No.	Special characteristics	Maximum limits of tolerance (Percent by weight per qtl.) for FAQ
1.	Impurities (foreign matter)	2
2.	Split or cracked seeds	3
3.	Damaged & weevilled	4
4.	Immature and shrivelled	5
5.	Moisture contents	9

Note:

1. **Foreign matter:** includes the leaves, stems, stones, straw, chaff, lumps of earth, non-edible seeds or any other impurity.
2. **Damaged and weevilled seeds:** shall be the seeds which are internally damaged or discoloured, broken and/ or wholly or partly bored/eaten by the weevil, materially affecting the quality.
3. **Immature and shriveled seeds:** shall be the grains which are not properly developed and / or shrunken.
4. **Slightly damaged seeds:** shall be the seed which are externally or partly damaged or discoloured without affecting the quality materially.

Source: Action plan and operational arrangements for Price Support Scheme in Rabi – 2004, NAFED, New Delhi.

iii) Grade specifications under Prevention of Food Adulteration Act (PFA):**Sunflower seed oil:**

Sunflower seed oil (barrey ka tel) means the oil expressed from the seeds of *Carthamus tinctorious*. It shall be clear, free from rancidity, suspended or other foreign matter, separated water, added colouring or flavouring substances, or mineral oil. It shall conform to the following standards:-

(a)	Butyro-refractometer reading at 40 ^o C	62.4 to 64.7
	OR	
	Refractive Index at 40 ^o C	1.4674 to 1.4689
(b)	Saponification value	186 to 196
(c)	Iodine value	135 to 148
(d)	Unsaponifiable matter	Not more than 1.0 per cent
(e)	Acid value	Not more than 6.0
(f)	Bellier test (Turbidity temperature – Acetic acid method)	Not more than 16 ^o C

[Test for argemone oil shall be negative.]

Source: The Prevention of Food Adulteration Act, 1954 along with The Prevention of Food Adulteration Rules, 1955.

iv) Grading under CODEX Standard for Sunflower seed oil:**CODEX-STAN 210 (Amended 2003, 2005)**

The Appendix to this Standard is intended for voluntary application by commercial partners and not for application by governments.

1. SCOPE:

This Standard applies to the vegetable oils described in Section 2.1 presented in a state for human consumption.

2. DESCRIPTION:

2.1 Product definitions:

2.1.19 Sunflower seed oil (sunflower oil) is derived from sunflower seeds (seeds of *Helianthus annuus* L.).

2.1.20 Sunflower seed oil - high oleic acid (high oleic acid sunflower oil) is produced from high oleic acid oil-bearing seeds of varieties derived from sunflower seeds (seeds of *Helianthus annuus* L.).

2.1.21 Sunflower seed oil - mid oleic acid (mid-oleic acid sunflower oil) is produced from mid-oleic acid oil-bearing sunflower seeds (seeds of *Helianthus annuus* L.).

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS:

3.1 GLC ranges of fatty acid composition (expressed as percentages):

Samples falling within the appropriate ranges specified in Table No. 5 (page No. 16) are in compliance with this Standard. Supplementary criteria, for example national geographical and/or climatic variations, may be considered, as necessary, to confirm that a sample is in compliance with the Standard.

3.1.3 High oleic acid sunflower oil must contain not less than 75% oleic acid (as % of total fatty acids).

3.3 Slip point:

Palm olein	not more than 24°C
Palm stearin	not less than 44°C
Palm superolein	not more than 19.5°C

4. FOOD ADDITIVES:

4.1 No food additives are permitted in virgin or cold pressed oils.

4.2 Flavours:

Natural flavours and their identical synthetic equivalents, and other synthetic flavours, except those which are known to represent a toxic hazard.

4.3 Antioxidants:

Maximum Level			
304	Ascorbyl palmitate	}	500 mg/kg
305	Ascorbyl stearate		individually or in combination
306	Mixed tocopherols concentrate		GMP
307	Alpha-tocopherol		GMP
308	Synthetic gamma-tocopherol		GMP
309	Synthetic delta-tocopherol		GMP
310	Propyl gallate		100 mg/kg
319	Tertiary butyl hydroquinone (TBHQ)		120 mg/kg

320	Butylated hydroxyanisole (BHA)	175 mg/kg
321	Butylated hydroxytoluene (BHT)	75 mg/kg
Any combination of gallates, BHA and BHT and/or TBHQ		200 mg/kg but limits above not to be exceeded
389	Dilauryl thiodipropionate	200 mg/kg

4.4 Antioxidant synergists:

330	Citric acid	GMP
331	Sodium citrates	GMP
384	Isopropyl citrates	}100 mg/kg individually or in combination
	Monoglyceride citrate	

4.5 Anti-foaming agents (oils for deepfrying):

900a	Polydimethylsiloxane	10 mg/kg
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5. CONTAMINANTS:

5.1 Heavy metals:

The products covered by the provisions of this Standard shall comply with maximum limits being established by the Codex Alimentarius Commission but in the meantime the following limits will apply:

<u>Maximum permissible concentration</u>	
Lead (Pb)	0.1 mg/kg
Arsenic (As)	0.1 mg/kg

5.2 Pesticide residues:

The products covered by the provisions of this Standard shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

6. HYGIENE:

6.1 It is recommended that the products covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3-1997), and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

6.2 The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

7. LABELLING:

7.1 Name of the food:

The product shall be labelled in accordance with the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 1-1991; Codex Alimentarius, Volume 1A). The name of the oil shall conform to the descriptions given in Section 2 of this Standard.

Where more than one name is given for a product in Section 2.1, the labelling of that product must include one of those names acceptable in the country of use.

7.2 Labelling of non-retail containers:

Information on the above labelling requirements shall be given either on the container or in accompanying documents, except that the name of the food, lot identification and the name and address of the manufacturer or packer shall appear on the container.

However, lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents.

8. METHODS OF ANALYSIS AND SAMPLING:

8.1 Determination of GLC ranges of fatty acid composition

According to ISO 5508: 1990 and 5509: 2000; or AOCS Ce 2-66 (97), Ce 1e-91 (01) or Ce 1f-96 (02).

8.2 Determination of slip point

According to ISO 6321: 2002 for all oils; AOCS Cc 3b-92 (02) for all oils except for palm oils.

8.3 Determination of arsenic

According to AOAC 952.13; AOAC 942.17; or AOAC 986.15.

8.4 Determination of lead

According to;AOAC 994.02; or ISO 12193: 2004; or AOCS Ca 18c-91 (03).

Table No.5: Fatty acid composition of vegetable oils as determined by gas liquid chromatography from authentic samples (expressed as percentage of total fatty acids)

Fatty acid	Sunflower seed oil	Sunflower seed oil (high oleic acid)	Sunflower seed oil (mid- oleic acid)
C6:0	ND	ND	ND
C8:0	ND	ND	ND
C10:0	ND	ND	ND
C12:0	ND-0.1	ND	ND
C14:0	ND-0.2	ND-0.1	ND-1
C16:0	5.0-7.6	2.6-5.0	4.0-5.5
C16:1	ND-0.3	ND-0.1	ND-0.05
C17:0	ND-0.2	ND-0.1	ND-0.05
C17:1	ND-0.1	ND-0.1	ND-0.06
C18:0	2.7-6.5	2.9-6.2	2.1-5.0
C18:1	14.0-39.4	75-90.7	43.1-71.8
C18:2	48.3-74.0	2.1-17	18.7-45.3
C18:3	ND-0.3	ND-0.3	ND-0.5
C20:0	0.1-0.5	0.2-0.5	0.2-0.4
C20:1	ND-0.3	0.1-0.5	0.2-0.3
C20:2	ND	ND	ND
C22:0	0.3-1.5	0.5-1.6	0.6-1.1
C22:1	ND-0.3	ND-0.3	ND
C22:2	ND-0.3	ND	ND-0.09
C24:0	ND-0.5	ND-0.5	0.3-0.4
C24:1	ND	ND	ND

ND - non detectable, defined as $\leq 0.05\%$

APPENDIX

OTHER QUALITY AND COMPOSITION FACTORS

This text is intended for voluntary application by commercial partners and not for application by governments.

1. QUALITY CHARACTERISTICS:

1.1 The colour, odour and taste of each product shall be characteristic of the designated product. It shall be free from foreign and rancid odour and taste.

Maximum level	
1.2 Matter volatile at 105°C	0.2 % m/m
1.3 Insoluble impurities	0.05 % m/m
1.4 Soap content	0.005 % m/m
1.5 Iron (Fe):	
Refined oils	1.5 mg/kg
Virgin oils	5.0 mg/kg
1.6 Copper (Cu)	
Refined oils	0.1 mg/kg
Virgin oils	0.4 mg/kg
1.7 Acid value	
Refined oils	0.6 mg KOH/g Oil
Cold pressed and virgin oils	4.0 mg KOH/g Oil
Virgin palm oils	10.0 mg KOH/g Oil
1.8 Peroxide value:	
Refined oils	up to 10 milliequivalents of active oxygen/kg oil
Cold pressed and virgin oils	up to 15 milliequivalents of active oxygen/kg oil

3. CHEMICAL AND PHYSICAL CHARACTERISTICS:

Chemical and Physical Characteristics are given in Table No.6 (Page No.19).

4. IDENTITY CHARACTERISTICS:

4.1 Levels of desmethylsterols in vegetable oils as a percentage of total sterols are given in Table No. 7 (Page No.19).

4.2 Levels of tocopherols and tocotrienols in vegetable oils are given in Table No. 8 (Page No.20).

5. METHODS OF ANALYSIS AND SAMPLING:

5.1 Determination of moisture and volatile matter at 105°C
According to ISO 662: 1998.

5.2 Determination of insoluble impurities
According to ISO 663: 2000.

5.3 Determination of soap content
According to BS 684 Section 2.5; or AOCS Cc 17-95 (97).

5.4 Determination of copper and iron

According to ISO 8294: 1994; or AOAC 990.05; or AOCS Ca 18b-91 (03).

5.5 Determination of relative density

According to IUPAC 2.101, with the appropriate conversion factor.

5.6 Determination of apparent density

According to ISO 6883: 2000, with the appropriate conversion factor; or AOCS Cc 10c-95 (02).

5.7 Determination of refractive index

According to ISO 6320: 2000; or AOCS Cc 7-25 (02).

5.8 Determination of saponification value (SV)

According to ISO 3657: 2002; or AOCS Cd 3-25 (03).

5.9 Determination of iodine value (IV)

Wijs - ISO 3961: 1996; or AOAC 993.20; or AOCS Cd 1d-1992 (97); or NMKL 39(2003).
The method to be used for specific named vegetable oils is stipulated in the Standard

5.10 Determination of unsaponifiable matter

According to ISO 3596: 2000; or ISO 18609: 2000; or AOCS Ca 6b-53 (01).

5.11 Determination of peroxide value (PV)

According to AOCS Cd 8b-90 (03); or ISO 3960: 2001.

5.12 Determination of total carotenoids

According to BS 684 Section 2.20.

5.13 Determination of acidity

According to ISO 660: 1996, amended 2003; or AOCS Cd 3d-63 (03).

5.14 Determination of sterol content

According to ISO 12228: 1999; or AOCS Ch 6-91 (97).

5.15 Determination of tocopherol content

According to ISO 9936: 1997; or AOCS Ce 8-89 (97).

5.16 Halphen test

According to AOCS Cb 1-25 (97).

5.17 Crismer value

According to AOCS Cb 4-35 (97) and AOCS Ca 5a-40 (97).

5.18 Baudouin test (modified Villavecchia test or sesame seed oil test)

According to AOCS Cb 2-40 (97).

5.19 Reichert value and Polenske value

According to AOCS Cd 5-40 (97).

Table No. 6 : Chemical and physical characteristics of crude vegetable oils

	Sunflower seed oil	Sunflower seed oil (high oleic acid)	Sunflower seed oil (mid-oleic acid)
Relative density (x° C/water at 20°C)	0.918-0.923 x=20°C	0.909-0.915 x=25°C	0.914-0.916 x=20°C
Apparent density (g/ml)	--	--	--
Refractive index (ND 40°C)	1.461- 1.468	1.467- 1.471 at 25°C	1.461- 1.471 at 25°C
Saponification value (mg KOH/g oil)	188-194	182-194	190-191
Iodine value	118-141	78-90	94-122
Unsaponifiable matter (g/kg)	≤ 15	≤ 15	≤15

Table No. 7: Levels of desmethylsterols in crude vegetable oils from authentic samples as a percentage of total sterols

	Sunflower seed oil	Sunflower seed oil (high oleic acid)	Sunflower seed oil (mid-oleic acid)
Cholesterol	ND-0.7	ND-0.5	0.1-0.2
Brassicasterol	ND-0.2	ND-0.3	ND-0.1
Campesterol	6.5-13.0	5.0-13.0	9.1-9.6
Stigmasterol	6.0-13.0	4.5-13.0	9.0-9.3
Beta-sitosterol	50.0-70.0	42.0-70.0	56.0-58.0
Delta-5-avenasterol	ND-6.9	1.5- 6.9	4.8-5.3
Delta-7-stigmastenol	6.5-24.0	6.5-24.0	7.7-7.9
Delta-7-avenasterol	3.0-7.5	ND-9.0	4.3-4.4
Others	ND-5.3	3.5-9.5	5.4-5.8
Total sterols (mg/kg)	1800-4500	2400-5000	1700-5200

ND - Non-detectable, defined as ≤ 0.05%

Table No.8: Levels of tocopherols and tocotrienols in crude vegetable oils from authentic samples (mg/kg)

	Sunflower seed oil	Sunflower seed oil (high oleic acid)	Sunflower seed oil (mid-oleic acid)
Alpha-tocopherol	403-935	400-1090	488-668
Beta-tocopherol	ND-45	10-35	19-52
Gamma-tocopherol	ND-34	3-30	2.3-19.0
Delta-tocopherol	ND-7.0	ND-17	ND-1.6
Alpha-tocotrienol	ND	ND	ND
Gamma-tocotrienol	ND	ND	ND
Delta-tocotrienol	ND	ND	ND
Total (mg/kg)	440-1520	450-1120	509-741

ND - Non-detectable.

Source: www.codexalimentarius.net

3.4.2 Adulterants and Toxins:

It has been reported that there are rare occurrence of aflatoxins in sunflower seeds. The sunflower oil is always high priced edible oil and hence adulterated with a wide varieties of non-edible oils like crude castor oil, mineral oils, cheap edible oils such as linseed, cotton seed, watermelon seed, rubber seed, tea seed etc. The sunflower contains polyphenols, chlorogenic acid and caffeic acid which is antinutritional and toxic and causes serious problem for human food. Excessive solvent residue in sunflower oil leads to carcinogenic effect on health.

3.4.3 Grading at producers' level and under Agmark:

The scheme "Grading at Producers' Level" was introduced in 1962-63 by Directorate of Marketing and Inspection. The main objective of this scheme is to subject the produce to simple tests and assign a grade before it is offered for sale. After grading, the producers get prices commensurate with the quality of the produce. The programme is being implemented by the state Governments and up to 31-03-2004, 1979 grading units were set up in the country. Grading of the produce at producers' level enables farmers to get higher price for their produce as well as it helps the consumers to get standard quality produce at fair price.

Table No. 9: Progress of grading of sunflower at producers' level and under Agmark

Year	At producers' Level		Under Agmark	
	Sunflower Seed (Quantity Tonnes)	Value (Rs. Lakh)	Sunflower oil (Quantity Tonnes)	Value (Rs. Lakh)
2002- 2003	142074.00	20785.13	12690.52	4885.67
2003- 2004	132171.00	20435.04	9935.28	5259.30
2004- 2005	97506.60	9356.43	6120.25	3241.82

Source: AGMARK Grading statistics-2002-03, 2003-04 and 2004-05, Directorate of Marketing and Inspection, Faridabad.

During the year 2004-2005, about 97506.60 tonnes of sunflower seed valued at Rs.9356.43 lakhs were graded at producers' level against 132171 tonnes of sunflower seed valued at Rs. 20435.04 lakh in the year 2003-2004.

However, only 6120.25 tonnes of sunflower oil valued worth Rs. 3241.82 lakhs were graded under Agmark during the year 2004-2005 for domestic consumption as against 9935.28 tonnes valued at Rs. 5259.30 lakhs during the year 2003-2004.

3.5 Packaging:

Packaging is very important as good packaging protect the produce from any damage during storage, transportation and other marketing operations. It provides convenience in handling during transportation and storage. In recent years, packaging plays an important role in marketing of produce. The good packaging of Sunflower also attracts consumer to pay more. National Agricultural Co-operative Marketing Federation of India Limited (NAFED) usually packs Sunflower seed in 50 Kg Nett B-Twill gunny bags.

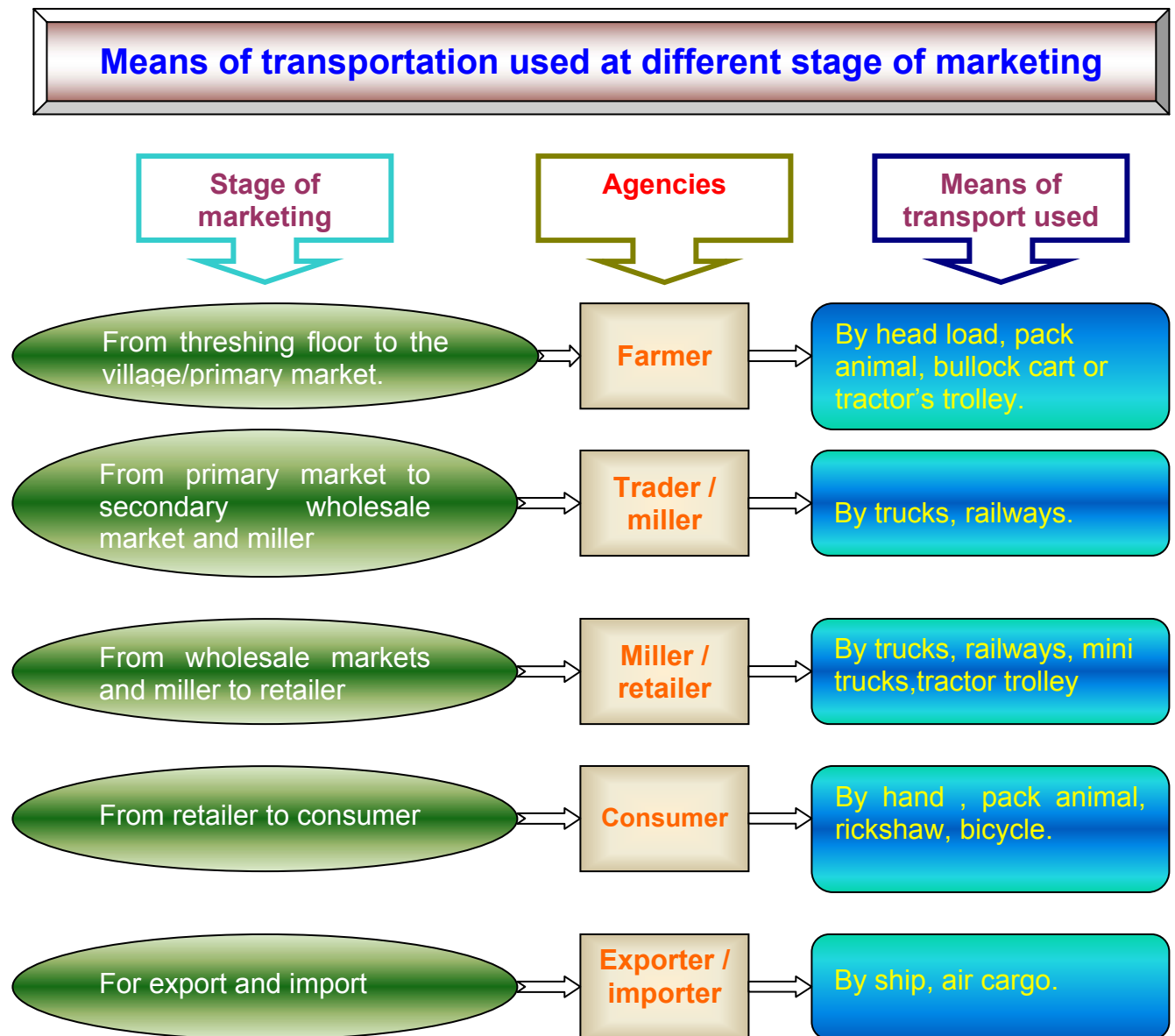
Criteria for selection of packaging material:

Packaging material should;

- Protect the quality and quantity of the produce.
- Prevent spoilage during transportation and storage.
- Suitable according to climatic and environmental conditions.
- **Convenient and suit the need of the consumer.**
- Attractive for display
- Tell information about quality, variety, date of packing, weight and price etc.
- Be convenient in handling operations.
- Be convenient to stack.
- Be cheap, clean and readily available.
- Be environment friendly and biodegradable.
- Be free from adverse chemicals.
- Conform to the requirements as laid down under PFA standards as amended from time to time.

3.6 Transportation:

The following means of transportation are used at different stages of marketing.



Availability of cheaper and convenient modes of transport:

There are different modes of transport used in sunflower transportation. Road and Rail transport are normally used for internal markets. However, for export and import, mainly Sea transport is used. The most common modes of transportation are;

- 1) **Road transportation:** Road transport is the most popular mode for movement of sunflower to the assembling markets as well as to the distribution centers. The following means of road transport are used in different parts of the country to transport Sunflower:

a) **Bullock carts/camel carts:**

Benefits:

1. **Suitable for small quantity of produce.**
2. **Cheap and easily available.**
3. **Easy transport for short distance.**
4. **Easily manufactured by village artisan.**
5. **Easily operated on *kaccha* road, muddy or sandy path.**

b) **Tractor trolley:**

Benefits:

1. **Carry larger quantity of produce than bullock carts in less time.**
2. **Suitable to transport produce in primary assembling markets in the absence of proper *pucca* road connecting the villages and market.**
3. **Multipurpose use of tractor for farmers.**

c) **Trucks:**

The truck is the most convenient means of transport throughout the country for longer distances for bulk quantity.

Benefits:

1. **Suitable for long distance.**
2. **Comparatively easily available.**
3. **Quick movement.**
4. **Convenient during loading and unloading.**
5. **Provide door to door delivery.**

6. Safe transport.

2) Railways: Railway is one of the most important means of transportation.

Benefits:

1. **Suitable for carrying larger quantity of produce.**
2. **Suitable for long distances through out India.**
3. **Comparatively cheaper and safer mode of transport.**

3) Water transport: This is the oldest and cheapest mode of transport. It includes river transport, canal transport and sea transport.

Benefits:

- i) **Suitable for carrying large quantity for export and import to other countries.**
- ii) **Comparatively cheaper mode of transport.**

3.7 Storage:

The storage is an important aspect of post harvest operations. Storage provides protection to produce against moisture, weather, insects, micro-organisms, rodents, birds and any other type of infestation and contamination. Storage losses are high when sunflower are harvested at high moisture content. Moisture content is the key factor that determines the storage life of sunflower. Moisture content ranging from 5 to 8 percent is the most suitable for storage of sunflower. Due to lack of storage facilities, farmers sellout their produce immediately after harvesting at low price. It is essential that during storage, sunflower should remain in good condition and not undergo any deterioration in quality.

Basic requirements for safe and scientific storage:

The following requirements should be fulfilled for safe storage of sunflower:

Selection of site: The storage structure should be located on a raised well-drained place. It should be easily accessible. The land of the site should be protected from humidity, excessive heat, direct sun rays, insects and rodents. Storage godown should be constructed on a well-built pucca platform at a height of not less than 1 foot above ground level to prevent dampness.

Selection of storage structure: The storage structure should be selected according to the quantity of Sunflower to be stored. In godowns, sufficient space should be provided between two stacks for proper aeration and movement of person for inspection.

Cleaning of storage structures:	The storage structures should be properly cleaned before storing Sunflower. There should be no left over grains, cracks, holes and crevices in the structure, which may harbour insects. The structure should be fumigated before storage.
Cleaning and drying of Sunflower:	Before storage, the sunflower should be properly cleaned and dried up to optimum moisture level. Sunflower seeds should be free from foreign matter, infested seeds to avoid quality deterioration and pest attack.
Cleaning of bags:	Use new and dry gunny bags. Before using, disinfect the old gunny bags by boiling in 1 percent Malathion solution for 3-4 minutes and dry it.
Separate storage of new and old stock:	To check infestation and to maintain hygienic condition of godown, the new and old stocks should be stored separately.
Cleaning of vehicles:	The vehicles used for transporting sunflower should be properly cleaned with phenyl to avoid infestation.
Use of dunnage:	Dunnage should be used before stacking bags to avoid absorption of moisture from floor. Bags should be kept on wooden crates or bamboo mats along with a cover of polythene sheet, preferably.
Proper aeration:	There should be proper aeration during clear weather condition but care should be taken to avoid aeration during rainy season.
Regular inspection:	Regular inspection of stored sunflower should be carried out to check infestation. It is necessary to maintain proper health and hygiene of the stock.

3.7.1 Major storage pests and their control measures:

Name of pest	Figure of pest	Damage	Control measures
1.Saw-toothed grain beetle <i>Oryzaephilus surinamensis</i> (Linn.)		Both beetle and larvae feed on broken and damaged seeds.	1. Careful sanitation is the best method to avoid stored pests. 2. Dispose off heavily infested seeds in wrapped, strong, plastic bags or in sealed containers.
2. Red rust flour beetle <i>Tribolium castaneum</i> (Herbst.)		Beetle and larvae both do not cause damage to whole seed but feed on broken and damaged seeds produced by milling and handling or infested /damaged seeds of other insects.	3. Maintenance of optimum moisture content (not >5%) is always critical in preventing the development of storage pests. 4. Broken seeds should not be stored for long periods.
3. Rice moth <i>Corcyra cephalonica</i>		Larvae contaminate the seeds with dense webbing, excreta and hairs. Whole seeds are bound into lumps.	5. Dusting with an inert substance such as attapulgitite-based clay dust (ABCD) helps to minimize storage insect problems.
4.Indian meal moth <i>Plodia interpunctella</i>		Indian meal moth is considered the most troublesome of the grain-infesting moths. Damage is caused by the larvae spinning silken threads as they feed and crawl, thus webbing food particles together.	6. Nitrogen (N ₂), Phosphine (PH ₃), Carbon Dioxide (CO ₂) gas can be used as fumigation. 7. Pheromone traps are commercially used for inspection, monitoring and pinpointing infestations of adult Indian Meal moths. Male moths are attracted to pheromone scent (sex-attractant). Traps can be hung indoors to capture moths on a sticky board. 8. The insecticide, aerosol sprays of synergized pyrethrins, is used to control nuisance of moths.

5. Rodents		Rodents eat whole and broken seeds. They spill more seeds than they consume. Rodents also contaminate sunflower by hair, urine and feces, which deteriorate the quality and cause many diseases, like cholera, ringworm, rabbies etc.	Rat cage: Different types of rat cages are available in the market. Caught rats can be killed by dipping into water. Poison baits: Anti-coagulant pesticide like Zinc phosphide is mixed with bread or any other food stuff used as bait. Keep baits for a week. Rat burrow fumigation: Put tablets of Aluminium Phosphide in each hole / burrow and block that hole by mud mixture to make it airtight.
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Source: www.ikisan.com

3.7.2 Storage structures:

- 1. Improved bins:** Circular steel bin, Plastic bin, Pre-fabricated steel bin with hopper bottom, Aluminium bin, RCC bin, Cement masonry bin and improved pusa bin.
- 2. Pucca godown:** These are made by brick-walls with cemented flooring for storing sunflower in bulk and bags.

3.7.3 Storage facilities:

i) Producers' storage:

Producers store sunflower in various types of traditional and improved structures. Generally, these storage structures are used for short period. Bulk storage of sunflower is more efficient than bag storage. Bulk storage structures suitable for farm storage include circular steel bin, plastic bin, pre-fabricated steel bin with hopper bottom, aluminium bin, RCC bin, cement masonry bin and improved pusa bin. Various bins made from materials like straw, clay, stone, metal etc are used in rural areas. Some producers also store sunflower in jute gunny bags or in gunny bags lined with polythene.

ii) Rural godowns:

Considering the importance of rural storage in marketing of agricultural produce, the Directorate of Marketing and Inspection initiated a Rural Godown Scheme, in collaboration with NABARD and NCDC, to construct scientific storage godown with allied facilities in rural areas and to establish a network of rural godowns in the States and Union Territories. The main objectives of Rural Godowns Scheme are as under:

1. Creation of scientific storage capacity with allied facilities in rural areas to meet the requirements of farmers for storing farm produce, processed farm produce, consumer articles and agricultural inputs;
2. Promotion of grading, standardization and quality control of agricultural produce to improve their marketability;
3. Strengthen agricultural marketing infrastructure in the country by paving the way for the introduction of a national system of warehouse receipts in the respect of agricultural commodities stored in such godowns;
4. Prevention of distress sale immediately after harvest by providing the facility of pledge financing and marketing credit; and
5. Reverse the declining trend of investment in the agriculture sector by encouraging the private and co-operative sectors to invest in the creation of storage infrastructure in the country.

The year-wise physical and financial performance under the scheme is given in Table No.10.

Table No.10: The year-wise physical performance under the Rural Godown Scheme

Year	Physical capacity (Lakh tonnes)	
	Target	Achievement
2001-03	20	67.35
2003-04	27	37.57
2004-05	38	36.91
2005-06	26	--
2006-07	10	--
Total	121	141.83

Source: www.agmarknet.nic.in

iii) Mandi godowns:

Most of the States and Union Territories have enacted Agricultural Produce Market (Regulation) Act. The APMCs have constructed godowns in the market yard. At the time of keeping the produce in the godown a receipt is issued indicating the quality and weight of

produce to be stored. The receipt is treated as negotiable instrument and eligible for pledge finance from the Scheduled Banks. The CWC and SWCs were also allowed to construct godowns in the market yards. Traders also have their permanent storage godowns or warehouses.

iv) Central Warehousing Corporation (CWC):

CWC was established during 1957. It is the largest public warehouse operators in the country. On 31st March 2005, CWC was operating 484 warehouses in the country with the total storage capacity of 10186395 tonnes. State-wise storage capacity with CWC as on 31-03-2005 is given below:

Table No.11: State-wise storage capacity with CWC as on 31-03-2005

Name of State	No of warehouses	Total capacity (in tonnes)
1.Assam	6	64200
2.Andhra Pradesh	50	1439916
3.Bihar	13	97179
4.Chandigarh	1	13602
5.Chhattisgarh	10	236826
6.Delhi	11	181342
7.Goa	2	103847
8.Gujarat	29	622886
9.Haryana	25	439517
10.Himachal Pradesh	3	7040
11. Jammu & Kashmir	1	21150
11.Jharkhand	3	35913
12.Karnataka	32	453332
13.Kerala	9	129452
14.Madhya Pradesh	31	674748
15.Maharashtra	63	1564146
16.Nagaland	1	13000
17.Orissa	11	188206
18.Pondicherry	1	8940
19.Punjab	30	773999
20.Rajasthan	27	375347
21.Tamil Nadu	26	801127
22.Tripura	2	24000
23.Uttaranchal	7	75490
24.Uttar Pradesh	50	1155926
25.West Bengal	40	685264
Total	484	10186395

Source: Central Warehousing Corporation, New Delhi.

v) State Warehousing Corporations (SWCs):

Various states have set up their own warehouses in the country. The area of operation of the State Warehousing Corporations are district place of the state. The total share capital of the state warehousing corporations is contributed equally by the Central Warehousing Corporation and the concerned State Government. The SWCs are under the dual control of the State Government and the CWC. As on 1st April 2005, SWCs were operating 1599 warehouses in the country with the total capacity of 195.20 lakh tonnes. The state-wise storage capacity available with SWCs as on 01.04.2005 are given below.

Table No.12: State-wise storage capacity available with SWCs as on 01.04.2005

Name of SWC	Total capacity (in lakh tonnes)
1. Andhra Pradesh	22.82
2. Assam	2.48
3. Bihar	2.03
4. Chhattisgarh	6.07
5. Gujarat	2.27
6. Haryana	16.07
7. Karnataka	8.98
8. Kerala	1.92
9. Madhya Pradesh	11.38
10. Maharashtra	12.20
11. Meghalaya	0.11
12. Orissa	4.05
13. Punjab	60.12
14. Rajasthan	7.19
15. Tamil Nadu	6.36
16. Uttar Pradesh	28.88
17. West Bengal	2.27
Grand Total	195.20

Source: Central Warehousing Corporation, New Delhi.

vi) Co-operatives:

To meet the increasing need for storage capacity, the National Co-operative Development Corporation (NCDC) encourages construction of scientific storage facilities by co-operatives, particularly at rural and market level.

Co-operative storage facilities are provided to the producer at cheaper rates, which reduces the storage cost. The co-operatives also provide pledge loan against the stored produce. The storage is more systematic and scientific than traditional storage. Financial assistance and subsidies are provided by Government organisations/banks to build co-

operative storage. The number and capacity of co-operative godowns assisted by NCDC in different states are as under.

Table No.13: State-wise co-operative storage facilities as on 31-3-2004

Name of State	Rural level	Market level	Total capacity (in tones)
1. Andhra Pradesh	4003	571	690470
2. Assam	770	264	298900
3. Bihar	2455	496	557600
4. Gujarat	1815	401	372100
5. Haryana	1454	376	693960
6. Himachal Pradesh	1640	209	204800
7. Karnataka	4958	960	693590
8. Kerala	1959	133	323335
9. Madhya Pradesh	5166	1024	1305900
10. Maharashtra	3852	1492	2010920
11. Orissa	1951	595	486780
12. Punjab	3884	830	1986690
13. Rajasthan	4308	378	496120
14. Tamil Nadu	4757	409	956578
15. Uttar Pradesh	9244	762	1913450
16. West Bengal	2834	469	483060
17. Other States	1046	233	644830
Grand Total	56096	9602	14119083

Source: National Co-operative Development Corporation, New Delhi.

3.7.4 Pledge finance system:

The farmers are often compelled to sell their produce immediately after harvest when the prices are low, in the absence of assured market finance at reasonable rate of interest. To avoid such distress sale, Government of India, promoted Pledge Finance Scheme through a network of rural godowns and negotiable warehouse receipt system. Through this scheme, small and marginal farmers can get immediate financial support to meet their requirements and retain the produce till they get remunerative price.

According to the RBI guidelines, loan/advances upto 75 percent of the value of the produce stored in the godown can be advanced to the farmers against pledge/hypothecation of agricultural produce (including warehouse receipts) subject to a ceiling of Rs. 5 lakh per borrower. Such loan is given for a period of 6 months, which can be extended upto 12

months based on financing banks' commercial judgement. The commercial banks/co-operative banks/RRBs, provide credit to the farmers for the produce stored in the godown under this scheme. The banking institutions accept the godown receipt on its being duly endorsed and delivered to bank for pledge loan against hypothecation of produce as per RBI guidelines. Farmers are given freedom to take back their produce once the pledge loan is repaid. Facility of pledge finance is extended to all farmers, whether they are the borrowing members of Primary Agricultural Credit Societies (PACS) or not. The District Central Cooperative Banks (DCCBs) directly finance individual farmers on the strength of the pledge.

Benefits:

- i) Increases the retention capacity of the small farmers to avoid distress sale.
- ii) Minimizes the farmers' dependence on the commission agents as the pledge finance provides financial support to them immediately after harvest period.
- iii) Participation of the farmers, irrespective of their land holding, increases the arrivals in market yards.
- iv) Gives a sense of security to the farmers even if their produce is not sold out in the market yard immediately.

4.0 MARKETING PRACTICES AND CONSTRAINTS

4.1 Assembling:

Major assembling markets:

Important assembling markets of major sunflower growing states are as under:

States	Important markets
1.Andhra Pradesh	Kurnool, Adoni, Nandyla, Yemminagar, Allagadda, Dhone, Nandikotkur, Atmakur, Banaganapally, Koilkunta, Allur, Pulivendala, Rayachoti, Jammalamadugu, Mydukur, Lakkireddipally, Badvel, Koduru, Siddavatam, Cuddapah, Kamalpuram, Dharmavaram, Kadiri, Tadipatri, Gooty, Penukonda, Uravakonda, Rayadurga, Kalyandurga, Anantpur, Hindupur, Madogasira
2. Karnataka	Chelekere, Bhagalkote, Talikote, Gadag, Bellary, Kottur, Koppal, Raichur, Bailhongal, Ramdurg, Sandathi, Sankeshwar, Siriguppa, Hagaribommanahalli, Mysore, Kollegal, Gauribiddenur, Chickabellapur, Chintamani, Chintradurga, Hiriyur, Tumkur, Pavgada, Madhugiri, Holealur, Channpatna, Bangalore (R), Dharwad, Hubli, Ranibennur, Badami, Bijapur, Yadgir, Shorapur, Bidur.
3. Punjab	Jallandhar city, Adampur, Nakoder, Shahkot, Bhogpur,

	Nawanshehar, Banga, Balachour, Hoshiarpur, Garhshanku, Tanda, Kurali, Roper, Kharar, Chamkaursahib, Samrula, Machiwara, Khanna, Jagraon, Abohar, Fuzilka, Zeera, Patiala, Nabha, Samana, Rajpura, Kalru, Balala, Amritsar, Gehrimandi, Raiya, Tarantaran, Kapurthala, Phagwara, Sultanpurdodli, Dhilwan
4. Maharashtra	Osmanabad, Chalisgaon, Latur, Khamgaon, Jalana, Baramati, Hingoli, Karmala, Risod, Majalgaon, Solapur, Barshi, Ahmedpur, Wasim, Ambejogai, Nandurbar, Akot, Phaltan, Shegaon, Karjat, Ahmednagar.
5. Bihar	Patna City, Muzaffarpur, Gaya, Betiah, Gulabgh.
6. Haryana	Chhachhrauli, Shahabad, Hisar, Hansa, Barwata, Adampur, Uklana, Feteahabad, Ratia, Bhattu Kalan, Bhuna, Uchana, Sirsa, Dabwali, Kalanwali, Ellenabad, Rewari, Namaul, Ateli, Kanina, Bhiwani, Charkhi, Dadri, Tauru, Nuh, Gurgaon, Punahana, Sohna, Hodal, Pataudi.
7. Tamil Nadu	Salem, Dharampur
8. Uttar Pradesh	Kannauj, Mohamadabad, Uttaripura, Chhibraman, Ujhani, Bindpe, Chaubepur, Sitapur, Mishriph, Kamalganj, Sujaganj, Hathras, Kosikala, Agra, Hapur, Aligarh, Kheragarh, Mathura, Jagner.

4.1.1 Arrivals:

During 2002-2003, the total arrivals of sunflower in the 32 markets of Andhra Pradesh were reported to be 125056.3 tonnes followed by 8 markets in Karnataka (74074.0 tonnes), whereas the arrivals in Punjab, Uttar Pradesh and Maharashtra were 21067.0, 10350.0 and 2272.0 tonnes respectively. The arrivals of sunflower during 2000-2001 to 2002-2003 in important markets of major producing states are given as under.

Table No. 14: Arrivals of sunflower in important markets of major producing states in India

Sl. No.	Name of the states	Arrivals (in tonnes)		
		2000-2001	2001-2002	2002-2003
1.	Andhra Pradesh (32 markets)	67348.3	64445.5	125056.3
2.	Karnataka (8 markets)	53086.0	45009.0	74074.0
3.	Maharashtra (1 markets)	1341.0	1455.0	2272.0
4.	Punjab (36 markets)	19550.3	6242.0	21067.0
5.	Tamil nadu (1 markets)	--	0.10	24.0
7.	Uttar Pradesh (12 markets)	7982.0	5498.0	10350.0

Source: Sub-offices of Directorate of Marketing and Inspection.

4.1.2 Despatches:

Sunflower were mostly despatched to the markets within the state or to the markets of the adjoining states. Sunflower from Andhra Pradesh markets were mainly despatched to Karnataka, Maharashtra and Tamil Nadu whereas Karnataka markets despatched mainly to Maharashtra, Tamil Nadu, Andhra Pradesh, Kerala. Punjab despatched to Maharashtra, Andhra Pradesh, Karnataka (as raw oil) whereas Uttar Pradesh markets despatched to Uttaranchal, Maharashtra. During 2000-2001 to 2002-2003, the despatches of sunflower from different states are as under:

States from where despatched	States to which arrived
1. Andhra Pradesh	Karnataka, Maharashtra, Tamil Nadu
2. Karnataka	Maharashtra, Tamil Nadu, Andhra Pradesh, Kerala
3. Maharashtra	Within state
4. Tamil Nadu	Within state
5. Punjab	Maharashtra, Andhra Pradesh, Karnataka (as raw oil)
6. Uttar Pradesh	Uttaranchal, Maharashtra

Source: Sub-offices of Directorate of Marketing and Inspection.

4.2 Distribution:

Assembling and distribution of the agricultural produce are closely related. The assembling deals with the movement of sunflower from the farm to the assembling centre while the distribution deals with its further movement to the consumer. The producer makes the movement of sunflower from the farm to the assembling centers, while a number of market functionaries are involved in the distribution dealing with its subsequent movement to the ultimate consumer.

The following agencies are involved in distribution of Sunflower at various stages of marketing:

- | | |
|---|--|
|  Producers |  Commission agents |
|  Village traders |  Sunflower millers/processors |
|  Itinerant traders |  Co-operative organisations |
|  Retailers |  Government organisations |
|  Wholesale merchants |  Exporters and importers |

4.2.1 Inter-state movements:

Inter-state movement of sunflower takes place by rail, road and river. Karnataka, Andhra Pradesh and Maharashtra together accounted for nearly 92 percent of total production of sunflower in the country during the year 2002-2003. These states play major role in its inter-state movements. Andhra Pradesh, Karnataka, Maharashtra, Punjab and Uttar Pradesh are the major exporting states while Tamil Nadu, Kerala, Uttaranchal, Karnataka, Andhra Pradesh and Maharashtra are the main importing states.

4.3 Export and import:

i) Sunflower seed:

Export:

Sunflower seed was exported mainly to Germany, Netherland, Belgium, Greece, Philippines, Thailand and U.K. During the year 2004-2005, the country exported 17184.27 quintals of sunflower seed valued at Rs. 646.00 lacs against 11613.03 quintals valued at Rs. 393.52 lacs in the year 2003-2004.

During the year 2002-2003 to 2004 -2005, export of sunflower seed from India to different countries and their value are given below:

**Table No. 15: India's export of sunflower seed (country-wise)
from 2002-2003 to 2004-2005**

**Quantity (in Quintal)
Value (Rs. in Lakhs)**

Sl. No.	Name of the Country	2002-03		2003-04		2004-05	
		Quantity	Value	Quantity	Value	Quantity	Value
1.	Belgium	361.50	8.43	2417.90	61.74	-	-
2.	Germany	3234.99	112.04	719.03	22.68	3010.00	119.53
3.	Greece	-	-	1000.00	98.46	-	-
4.	Netherland	7458.52	272.30	4048.02	119.67	9663.00	337.01
5.	Philippines	-	-	179.57	3.72	1050.00	12.73
6.	Thailand	-	-	1150.00	16.48	1274.00	64.82
7.	U.K.	1691.40	65.44	181.44	6.93	1300.00	52.26
8.	Others	4165.60	124.87	1917.07	63.84	887.27	59.64
	Total	16912.01	583.09	11613.03	393.52	17184.27	646.00

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

Import:

During the year 2003-2004, India imported 1.20 quintals of sunflower seed valued at Rs. 0.76 lacs against 50.22 quintals valued at Rs. 1.32 lacs in the year 2004 -2005 mainly from Taiwan, Australia, U.A.E., France, Iran and U.K. During 2002-2003 to 2004-2005, import of sunflower seed in India from different countries are given in Table No.16.

*Table No.16: India's import of sunflower seed (country-wise)
from 2002-2003 to 2004-2005*

**Quantity (in Quintal)
Value (Rs. in Lakhs)**

Sl. No.	Name of the Country	2002-03		2003-04		2004-05	
		Quantity	Value	Quantity	Value	Quantity	Value
1	Taiwan	-	-	1.20	0.76	-	-
2	Australia	2.00	0.59	-	-	-	-
3	U. A. E.	0.90	0.39	-	-	-	-
4	France	-	-	-	-	0.20	0.07
5	Iran	-	-	-	-	50.00	1.21
6	U.K.	-	-	-	-	0.02	0.03
	Total	2.90	0.97	1.20	0.76	50.22	1.32

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

ii) Sunflower seed oil:

Export:

Sunflower seed oil (crude) was exported mainly to Djibouti, Nepal, Sri Lanka, USA, United Arab Emirates, Brunei and Singapore. During the year 2004-2005, the country exported 91.27 thousand Kgs valued at Rs 31.65 lacs against 1.30 thousand Kgs valued at Rs 0.71 lacs in the year 2003-2004

During the year 2003-2004 to 2004-2005, export of sunflower seed oil (crude) from India to different countries and their value are given below:

Table No. 17: India's export of sunflower seed oil (crude) (country-wise) from 2003-2004 to 2004-2005

(Quantity in thousand Kgs and Value in Rs. lacs)

Name of country	2003-2004		2004-2005	
	Quantity	Value	Quantity	Value
Djibouti	--	--	67.00	21.42
Nepal	1.00	0.58	12.65	4.06
Sri Lanka	--	--	7.00	4.00
USA	--	--	2.80	1.39
U A E	--	--	0.32	0.53
Brunei	--	--	1.50	0.26
Singapore	0.30	0.12	--	--
Total	1.30	0.71	91.27	31.65

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

Import:

During the year 2003-2004, India imported 107374.59 thousand Kgs of sunflower seed oil (crude) valued at Rs. 28868.55 lacs against 34791.00 thousand Kgs valued at Rs. 9810.92 lacs in the year 2004-2005 mainly from Argentina, Brazil, Indonesia, South Africa and U S A. During 2003-2004 to 2004-2005, import of sunflower seed oil (crude) in India from different countries are as under:

Table No.18: India's import of sunflower seed oil (crude) (country-wise) from 2003-2004 to 2004-2005

Name of country	Quantity (in Thousand Kgs)	Value (Rs in lacs)	Quantity (in Thousand Kgs)	Value (Rs in lacs)
	2003-2004		2004-2005	
Argentina	100,594.00	26,865.35	34,791.00	9,810.92
Brazil	2,353.00	591.05	--	--
Indonesia	750.00	173.29	--	--
South Africa	2,148.59	538.65	--	--
U S A	1,529.00	700.20	--	--
Total	107,374.59	28,868.55	34,791.00	9,810.92

Source: Directorate General of Commercial Intelligence and Statistics (DGCIS), Kolkata.

4.3.1 Sanitary and Phyto-Sanitary (SPS) requirements:

The Sanitary and Phyto-sanitary (SPS) measures are an integral part of export and import trade under GATT (General Agreement on Trade and Tariffs), 1994. The aim of the agreement is to prevent the risk of introduction of new pests and diseases in new regions i.e. importing countries. As per provisions made under this agreement, the standards framed should be such that the minimum level of protection required by an importing country should be fulfilled. In order to achieve this objective, the agreement to set up international standards and guidelines under the aegis of Codex Alimentarius Commission (Codex) was to develop food standards, by laying down guidelines and related texts such as Codex of tactics was finalised under the joint aegis of FAO/WHO. Food standard programmes were aimed to protect health of the consumers and ensuring fair trade practices in the food trade as well as to promote co-ordination of all food standards work undertaken by international government and non-government organisation.

The SPS agreement applies to all Sanitary and Phyto-Sanitary measures, which may directly or indirectly, affect international trade. Sanitary measures deal with human or animal health, and Phyto-Sanitary measures are related to plant health.

SPS measures are applied in four situations for the protection of human, animal or plant health:

- Risks arising from the entry, establishment or spread of pests, diseases, disease-carrying organisms or disease causing organisms.
- Risks coming from additives, contaminants, toning or disease-causing organisms in foods, beverages or feedstuffs.
- Risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment or spread of pests.
- Prevention or limitation of damage caused by the entry, establishment or spread of pests.

The SPS standards commonly applied by Governments which affect imports are:

- (i) Import ban (Total/partial) is generally applied when there is a significant rate of risk about a hazard.
- (ii) Technical specifications (Process standards/Technical standards) are most widely applied measures and permit import subject to compliance with pre-determined specifications.
- (iii) Information requirements (Labelling requirements/Control on voluntary claims) permit imports provided they are appropriately labelled.

Procedure for issue of SPS certificate for export:

During export, in order to make plant materials free from quarantine and other injurious pests to conform with the prevailing Phyto-Sanitary regulations of the importing country, the exporter needs to give a suitable disinfestation / disinfection treatment, without affecting the viability for sowing / edibility of the plants/seeds.

For plant materials meant for export, Government of India, has authorized some Private Pest Control Operators (PCO) who have the expertise, men and materials for treating the export agricultural cargo / produce. The exporter has to apply to the officer in charge (Plant Protection and Quarantine Authority, Department of Agriculture and Cooperation) for Phyto-Sanitary Certificate (PSC) in prescribed application form at least 7 to 10 days in advance of the export. Before submitting the application for issue of PSC, it should be ensured that the cargo is treated properly by the licensed PCO.

4.3.2 Export procedures:

The exporter should keep in mind about the following laid down procedure during export of sunflower oilseeds:

1. Importer-Exporter code (IE code) number is to be obtained from the Director General of Foreign Trade (DGFT).
2. Register with the concerned Export Council/Authority e.g. Agricultural and Processed Food Export Development Authority (APEDA) to obtain registration cum membership certificate and it is also required to obtain permissible benefit from government.
3. Quality of product is to assess by any inspecting agency to obtain the certificate.

4. Export under OPEN GENERAL LICENCE i.e. No Restrictions/ No Licence, Generally, the buyers mention the conditions of quality in the contract; accordingly, the exporter approach the recognized laboratories with samples.
5. Product is then to be shifted to port.
6. Marine insurance cover is to be obtained from any insurance agency.
7. Contact the clearing and forwarding (C&F) agent for sorting the goods in godowns and collect the shipping bill for allowing shipment by the Custom Authority.
8. Shipping Bill is to be submitted by C & F agent to custom house for verification.
9. The C & F agent presents shipping bill to Preventive Officer for loading into the ship.
10. After loading, a mate receipt is issued by Captain of ship to the Superintendent of the port who calculates port charges and collects the same from the C&F agent.
11. After that payment is made, the mate receipt is obtained from the port authority to prepare bill of loading for the respective exporter.
12. Then C & F agent sends the bill of loading to the respective exporter.
13. After receiving the documents, exporter obtains a certificate of origin from Chamber of Commerce, i.e. the goods are of Indian origin.
14. Exporter informs the importer regarding the date of shipment, name of vessel, bill of loading, customer's invoice, packing list etc.
15. Exporter for verification of documents submits all papers to the concerned bank.
16. Bank sends documents to the foreign importer to enable him to take delivery of goods and payment to the exporter.
17. After receiving papers, importer makes payment through bank and also sends documents called GR Form to RBI.
18. Then exporter now applies for various benefits from duty drawback scheme.

4.4 Marketing constraints:

- | | |
|---|--|
| i) Lack of marketing information | : Due to lack of market information regarding prices, arrivals etc., prevailing in other markets, producers sale the sunflower in the village and nearby market at lower price. |
| ii) Adoption of grading | : Grading of sunflower at producers' level ensures better prices to producers and better quality to consumers. However, most of the markets are lagging behind in providing grading service at producers' level. |
| iii) Inadequate storage facilities | : Due to inadequate storage facilities in rural areas, substantial quantity of their produce is lost by way of driage, spoilage, rodents etc. Farmers are also forced to sell their produce just after harvest due to lack of storage facilities. To avoid the distress sale, adequate storage facilities in villages are necessary. |

- iv) Transportation facilities** : Due to inadequate facilities of transportation at village level, in most of the states, producers are forced to sell their produce in the village itself to itinerant merchants or traders directly at lower price than prevailing in the markets.
- v) Training of producer** : The farmers are not properly trained in marketing system. Training will improve their skill for better marketing of their produce.
- vi) Malpractices** : Many malpractices prevail in the markets i.e. excess weightment, delay in payment, high commission charges, delay in weighing and auction, large quantity of samples from the produce, different kinds of arbitrary deductions for religious and charitable purposes etc.
- vii) Financial problem** : Lack of market finance is one of the major marketing problems in the smooth running of marketing chain.
- viii) Infra-structure facilities** : Due to inadequate marketing infra-structural facilities with producers, traders, millers and at market level, the marketing efficiency is affected adversely.
- ix) Superfluous middlemen** : The existence of a long chain of middlemen reduces the producer's share in consumer's rupee.

5.0 MARKETING CHANNELS, COSTS AND MARGINS

5.1 Marketing channels:

A) Private marketing channel:

The following are the important marketing channels for marketing of sunflower:

i) **Producer → Commission Agent → Wholesaler → Processor → Consumer**

ii) **Producer → Miller/Processor → Miller Retail stores → Consumer**

iii) **Producer → Solvent contractors association → Wholesaler → Retailer → Consumer**

iv) **Producer → Solvent contractors association → Processing miller → Wholesaler → Retailer → Consumer**

v) Producer → Contracting agency → Miller → Wholesaler → Retailer → Consumer

vi) Producer → Contracting agency/Buyer → Processor → Wholesaler → Retailer → Consumer

B) Institutional marketing channel:

Sunflower is also purchased by the public and co-operative sector agencies. It plays a very significant role in the procurement and distribution of Sunflower. National Agricultural Co-operative Marketing Federation of India Limited (NAFED) is the nodal agency for procurement of Sunflower. The main institutional marketing channel for sunflower is as under:

1. Producer → Village Co-operative Society → Processing Units of Co-operatives →

State Co-operative Federation → Co-operative Retail Stores → Consumers

2. State Co-operative Marketing → Oil Miller (Private/Co-operative) →

Co-operative Retail Store → Consumer

3. Producer → Village Co-operative Society → Oil Miller → Oil Wholesaler → Retailer → Consumer

Criteria for selection of channels:

Following are the criteria to select the efficient marketing channel:

1. The channel, which ensures the higher share to producer and also provides cheaper price to consumer, is considered to be good or efficient channel.
2. The shorter channel having lesser market cost.
3. Commission charges and market margins received by the intermediaries, such as trader, commission agent, wholesaler and retailer should be low.
4. Select the channel which distributes the produce appropriately at least expenses and secure the desired volume of disposal.
5. Transportation cost in that channel.

5.2 Marketing costs and margins:

Marketing costs:

Marketing costs are the actual expenses incurred in bringing goods and services from the producer to the consumers. The marketing costs normally include;

- i) handling charges at local points,
- ii) assembling charges,
- iii) transport and storage costs,
- iv) handling charges by wholesalers and retailers,
- v) expenses on secondary services like financing, risk taking and market intelligence, and
- vi) profit margins taken by different agencies.

Marketing margins:

Margin refers to the difference between the price paid and received by a specific marketing agency such as a single retailer, or by any type of marketing agency, i.e. retailers or wholesalers or by any combination of marketing agencies in the marketing system as a whole. The total marketing margin includes cost involved in moving the sunflower from producer to consumer and profits of various market functionaries.

$$\text{Total marketing margin} = \text{Cost involved in moving the Sunflower from producer to consumer} + \text{Profits of various market functionaries}$$

The absolute value of the total marketing margin varies from market to market, channel to channel and time to time. The marketing cost incurred by farmers and traders at Regulated markets includes i) Market fee, ii) Commission, iii) Taxes, and iv) Other miscellaneous charges.

i) Market fee: Market fee or entry fee is collected by the market committee of the market. It is charged either on the basis of weight or on the basis of the value of the produce. It is usually collected from the buyers. The market fee differs from state to state. It varies from 1.0 per cent to 2.5 per cent ad valorem.

ii) Commission: It is paid to the commission agent, and may be payable either by seller or by the buyer or sometimes by both. The charge is usually made in cash and varies considerably.

iii) Taxes: Different taxes are charged in different markets such as toll tax, terminal tax, sales tax, octroi etc. These taxes leviable differ from market to market in the same state as also from state to state. These taxes are usually payable by the seller.

iv) Miscellaneous charges: In addition to the above mentioned charges, some other charges are levied in markets. These include handling and weightment charges (weighing,

loading, unloading, cleaning etc.), charity contribution in cash and kind, grading charges, postage, charges payable to water man, sweeper, choukidar etc. These charges may be payable either by the seller or by the buyers.

Market fee, commission charges, taxes and other miscellaneous charges in different states are given in the Table No.19.

Table No.19: Market fee, commission, taxes and miscellaneous charges on Sunflower in major producing states

State	Market fee	Commission	Sales tax	License fee Rs. Per annum	Other charges
1.Andhra Pradesh	1%	2%	4%	For turnover >Rs 1.0 crore — Rs 600/- Rs 50 lacs to Rs 1.0 crore — Rs 400/- < Rs 50 lacs —Rs 200/-	
2.Karnataka	1% of commodity value	2%	NIL	Rs.200/-	
3.Maharashtra	1%	2.5%	--	Rs.200/-	
4.Tamil Nadu	--	--	--	Wholesaler—Rs 100/- Other trader—Rs 75/- Small & Petty Trader—Rs 75/-	1% of sale value as service charges
5.Uttar Pradesh	2.5%	1.5%	4%	1.) Wholesaler cum C.A. / Wholesaler / Arhatia / Mill//Factory/Dalal — Rs.250/- 2.)Storage Owner/Transport Agency- Rs. 200/- 3.)Small oil mill —Rs. 150/- 4.) Retailer -100/- 5.) Weighmen/Palladar- Rs. 25/-	Dalali — 0.5%

Source: Sub-offices of Directorate of Marketing and Inspection.

6.0 MARKETING INFORMATION AND EXTENSION

Marketing information:

Marketing information is important in all the stages of marketing right from farm to ultimate consumption and simultaneously, for all the participants in marketing. Marketing information is essential for producers in planning production and market led production. It is equally important for other market participants for trading and also for consumers. Recently, Government of India has launched Agricultural Marketing Research and Information Network Scheme through Directorate of Marketing & Inspection (DMI) to bring out improvement in the present market information scenario by linking all Agricultural produce wholesale markets in the States and Union Territories in a phased manner. The data received from markets is being displayed on the website www.agmarknet.nic.in.

Marketing extension:

Market extension is a vital service for enlightening the farmers about proper marketing and improving their awareness in various aspects of post-harvest management for efficient and cost effective marketing.

Benefits : It;

- ★ Provides the up-to-date information on the arrivals and prices of agricultural commodities of different markets.
- ★ Helps the producers to take right decision, when, where and how much to market their produce.
- ★ Educates the producers/traders about the post-harvest management i.e.
 - a) Harvesting care
 - b) Techniques to minimise losses during post-harvest period.
 - c) Value addition to the produce by proper cleaning, processing, packaging, storage and transportation.
- ★ Orients the producers/traders/consumers about price trends, demand and supply situation etc.
- ★ Orients the producer regarding the importance of grading, proper storage, co-operative/group marketing, direct marketing, contract farming, future trading etc.
- ★ Provides the information about the sources of credit availability, various Govt. schemes, policies, rules and regulations etc.

Sources of Marketing Information: The following are the sources of marketing information available in the country:

Source / Institution	Activities for marketing information and extension
1. Directorate of Marketing and Inspection (DMI), NH-IV, CGO Complex, Faridabad. <u>Website:</u> www.agmarknet.nic.in	➤ Provides information through nationwide Marketing Information Network (“AGMARKNET” portal). ➤ Marketing extension through training to consumers, producers, graders, etc. ➤ Marketing research and surveys. ➤ Publication of reports, pamphlets, leaflets, Agricultural Marketing journal, Agmark standards etc.
2. Directorate of Economics and Statistics, Shastri Bhavan, New Delhi. <u>Website:</u> www.agricoop.nic.in	➤ Compilation of agricultural data on area, production and yield for development and planning. ➤ Dissemination of market intelligence through publication and Internet.
3. Directorate General of Commercial Intelligence and Statistics (DGCIS), 1, Council House Street, Kolkata-1 <u>Website:</u> www.dgciskol.nic.in	➤ Collection, compilation and dissemination of marketing related data i.e. export-import data, inter state movement of food grains etc.
4. Central Warehousing Corporation (CWC), 4/1 Siri Institutional Area, Opp. Siri fort, New Delhi-110016 <u>Website:</u> www.fieo.com/cwc/	➤ Farmers Extension Service Scheme was launched by CWC in the year 1978-79 with the following objectives : ◆ i) To educate farmers about the benefit of scientific storage and use of public warehouses. ◆ ii) To impart training to the farmers on the techniques of scientific storage and preservation of food grains. ◆ iii) To assist farmers in getting loans from the banks against pledge of warehouse receipt. ◆ iv) Demonstration of spraying and fumigation methods to control insects.

5. Agricultural Produce Market Committees (APMC),	➤ Provide market information on arrivals, prevailing prices, despatches etc. ➤ Provide market information of adjoining / other market committees. ➤ Arranges training, tours, exhibitions etc.
6. State Agricultural Marketing Boards, at different state capital	➤ Provide marketing related information to co-ordinate all the market committees in the state. ➤ Arrange seminars, workshops and exhibitions on subjects related to agricultural marketing. ➤ Provide training facilities to producers, traders and employees of the Boards.
7. Federation of Indian Export Organisations (FIEO), PHQ House(3 rd Floor) Opp. Asian Games, New Delhi-110016	➤ Provide information to its members about latest developments of export and import. ➤ Organise seminars, workshops, presentations, tours, buyer-seller meets, sponsoring participation in international trade fairs, exhibitions and providing advisory services with specialized divisions. ➤ Provide information about market development assistance schemes. ➤ Provide useful information on India's export and import with diverse database.
8. Kisan Call Centers (New Delhi, Mumbai, Chennai, Kolkata, Hyderabad, Bangalore, Chandigarh and Lucknow)	➤ Provides expert advise to the farmers. ➤ These centers operate through toll free telecom lines throughout the country. ➤ A country-wide common four digit number 1551 has been allocated to these centers.
9. Mass Media Support to Agriculture Extension	➤ Mass media support to agriculture extension has been augmented with three new initiatives. i) The first component establishes a cable satellite channel for national broadcast using the existing facilities available with Indira Gandhi National Open University (IGNOU). ii) The second component is use of low and high power transmitters of Doordarshan for providing area specific telecast. Initially, 12 locations chosen to launch broadcasting are Jalpaiguri (West Bengal), Indore (Madhya Pradesh), Sambhalpur (Orissa), Shillong (Meghalaya), Hissar (Haryana), Muzzafarpur (Bihar), Dibrugarh (Assam), Varanasi (Uttar Pradesh), Vijaywada (Andhra Pradesh),

	Gulbarga (Karnataka), Rajkot (Gujarat), Daltonganj (Jharkhand). iii) The third component is use of FM transmitter network of All India Radio (AIR) to provide area specific broadcasting through 96 FM stations.
10. Agriculture-Clinics and Agri-Business by Agriculture Graduates	➤ A central sector scheme “Establishment of Agriculture-Clinics and Agri-business Managed by Agriculture Graduates” is being implemented since 2001-02. ➤ The aim is to provide opportunity to all eligible agriculture graduates to support agriculture development through economically viable ventures. ➤ The scheme is being jointly implemented by NABARD, National Institute of Agricultural Extension Management (MANAGE) and Small Farmers’ Agri-business Consortium (SFAC) in association with about 66 reputed training institutes in the country.
11. Different websites on Agricultural Marketing Information	www.agmarknet.nic.in www.agricoop.nic.in www.fieo.com/cwc/ www.ncdc.nic.in www.ikisan.com www.fmc.gov.in www.icar.org.in www.fao.org www.agriculturalinformation.com www.agriwatch.com www.kisan.net www.agnic.org www.nafed-india.com www.indiaagronet.com www.nic.in/eximpol www.agrisurf.com www.commodityindia.com

Kisan Call Centre :

The Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India launched Kisan Call Centres on January 21st, 2004 throughout the country. It has the objective of affording instant solution to the problems faced by the farmers during crop cultivation under diverse challenging situations by using local language. The call centres are acting as composite help centres, which consist of a complex tele-communication

infrastructure, computer support and human resources organized to manage effectively and efficiently the queries raised by farmers instantly in local languages. The subject matter specialists using telephone and computer are used to interact with farmers to understand their problems and answer their queries as soon as possible. This is a new dimension in agricultural extension management, which makes the full use of on-going information and communication revolution by connecting the farming community in the remotest areas of the country with the experts in agricultural field.

Progress of Kisan Call Centre:

Total calls answered during 02-07-2005 to 20-05-2005: **55245**

Aggregate average calls per month: **2511**(approx.)

Overall average calls per day: **84**

Source: Yojana, August 2005

7.0 ALTERNATIVE SYSTEMS OF MARKETING

7.1 Direct marketing:

Direct marketing is an innovative concept, which involves marketing of produce i.e. sunflower by the farmer directly to the consumers/millers without any middlemen. Direct marketing enables producers and millers and other bulk buyers to economize on transportation cost and improve price realization. It also provides incentive to large scale marketing companies i.e. millers and exporters to purchase directly from producing areas. Direct marketing by farmers to the consumers has been experimented in the country through *Apni Mandis* in Punjab and Haryana. The concept with certain improvements has been popularised in Andhra Pradesh through *Rythu Bazars*. At present, these markets are being run at the expense of the state exchequer, as a promotional measure, to encourage marketing by small and marginal producers without the involvement of the middlemen. In these markets, different commodities are marketed alongwith fruits and vegetables.

Benefits:

- ★ It increases profit of the producer.
- ★ It helps in better marketing of sunflower.
- ★ It minimizes marketing cost.
- ★ It encourages distribution efficiency.
- ★ It promotes employment to the producer.
- ★ Direct marketing enhances the consumer satisfaction.
- ★ It provides better marketing techniques to producers.
- ★ It encourages direct contact between producers and consumers.
- ★ It encourages the farmers for retail sale of their produce.

7.2 Contract marketing:

Contract marketing is a system of marketing, where selected crop is grown for marketing by farmers under a 'buy-back' agreement with an agency (entrepreneur or trader or processor or manufacturer). In the wake of economic liberalization, it has gained momentum as the national and multinational companies enter into contracts for marketing of agricultural produce. They also provide technical guidance, capital and input supply to contracted farmers. Contract marketing ensures continuous supply of quality produce at mutually contracted price to contracting agencies, as well as ensures timely marketing of the produce. Contract marketing is beneficial to both the parties i.e. farmers and the contracting agencies.

Advantages to farmers: -

- ★ Price stability ensuring fair return of produce.
- ★ Assured marketing outlet and no involvement of middlemen.
- ★ Prompt and assured payments.
- ★ Technical advice in the field of production till harvesting.
- ★ Fair trade practices.
- ★ Credit facility.
- ★ Crop insurance.
- ★ Exposure to new technology and best practices.

Advantages to contracting agency: -

- ★ Assured supply of produce (raw materials).
- ★ Control on need based production/post-harvest handling.
- ★ Control on quality of produce.
- ★ Stability in price as per mutually agreed contract terms and conditions.
- ★ Opportunities to acquire and introduce desired varieties of crop.
- ★ Help in meeting specific customer needs/choice.
- ★ Better control on logistics.
- ★ Strengthen producer-buyer relationship.

Punjab has emerged as a highly potential state on promoting and propagating contract marketing in the country. In Punjab, sunflower is grown in the districts of Ludhiana, Patiala, Kapurthala, Fatehgarh Sahib, Roopnagar, Jalandhar, Hoshiarpur, Moga, Nawasahar and Amritsar. The crop is cultivated from December/January and marketed in the month of April-June. The varieties mostly grown for contract marketing are PAC 109, PAC 3776 and MONSANTO. Mahindra Sulabh Services Limited is the main contracting agency for contract farming of sunflower in Punjab.

7.3 Co-operative marketing:

"Co-operative marketing" is the system of marketing in which a group of producers join together and register them under respective State Co-operative Societies Act to market their produce jointly. The members also deal in a number of co-operative marketing activities i.e. purchasing of produce, grading, packing, processing, storage, transport, finance, etc. The co-operative marketing means selling of the member's produce directly in the market, which

fetches remunerative prices. Co-operative societies market the members produce collectively and secure advantages of economy of scale to its members. It also provides fair trade practices and protect against manipulations / malpractices. The main objectives of co-operative marketing are to ensure remunerative prices to the producers, reduction in the cost of marketing and monopoly of traders.

The co-operative marketing structure in the different states consists of;

- i) **Primary Marketing Society (PMS)** at the Mandi level.
- ii) **State Co-operative Marketing Federation (SCMF)** at the State level.
- iii) **National Agricultural Co-operative Marketing Federation of India Limited (NAFED)** at the National level.

National Co-operative Development Corporation (NCDC) and State Governments are providing financial assistance and other facilities for development of Co-operative Marketing Societies.

National Agricultural Co-operative Marketing Federation of India Ltd. (NAFED): The Government of India has entrusted NAFED with the support price purchase operations of sunflower.

National Dairy Development Board (NDDB): The National Dairy Development Board (NDDB) is implementing an integrated oilseed and vegetable oil production, procurement, processing and marketing project through a two-tier co-operative structure. NDDB entered the consumer pack market for edible oils through its 'Dhara' brand name.

Benefits:

- Remunerative price to producers.
- Reduction in cost of marketing.
- Reduction in commission charges.
- Effective use of infrastructure.
- Credit facilities.
- Reduces malpractices.
- Marketing information.
- Supply of agricultural inputs.
- Collective processing.
- Timely and easy transportation service.

7.4 Forward and future markets:

Forward trading means an agreement or a contract between seller and purchaser, for a certain quality and quantity of a commodity for making delivery at a specified future time, at contracted price. It is a type of trading, which provides protection against the price fluctuations of agricultural produce. Producers, traders and millers utilize the future contracts to transfer the price risk. Presently, future markets in the country are regulated through Forward Contracts (Regulation) Act, 1952 (FMC). The Forward Markets Commission (FMC) performs the functions of advisory, monitoring,

supervision and regulation in future and forward trading. Forward trading transactions are performed through exchanges owned by the associations registered under the Act. These exchanges operate independently under the guidelines issued by the FMC.

After the recent decision in February, 2003 of the Cabinet Committee on Economic Affairs (CCEA), Government of India, future trading has been allowed for 148 commodities including sunflower, under section 15 of the Forward Contracts (Regulation) Act of 1952. Earlier, sunflower was not allowed for future trading.

Forward contracts are broadly of two types:

a) Specific delivery contracts: Specific delivery contracts are essentially merchandising contracts, which enable producers and consumers of commodities to market their produce and cover their requirements respectively. These contracts are generally negotiated directly between parties depending on availability and requirement of produce. During negotiation, terms of quality, quantity, price, period of delivery, place of delivery, payment term, etc. are incorporated in the contracts.

b) Other than specific delivery contracts: Though this contract has not been specifically defined under the act, these are called as 'future contracts'. Futures contracts are forward contracts other than specific delivery contracts. These contracts are usually entered into under the auspices of an Exchange or Association. In the future contracts, the quality and quantity of commodity, the time of maturity of contract, place of delivery etc. are all standardized and contracting parties have to negotiate only the rate at which contract is entered into.

Benefits:

Futures contracts perform two important functions i) Price discovery and ii) Price risk management. It is useful to all segments of economy.

Producers: It is useful to the producer because they can get idea of price likely to prevail at a future point of time and, therefore facilitate the planning of production.

Traders/Exporters: The future trading is very useful to the traders/exporters as it provides an advance indication of the price likely to prevail. This helps the traders/exporters in quoting a realistic price and, thereby, secure trading/export contract in a competitive market.

Millers/Consumers: Future trading enables the millers/consumers to get an idea of the price at which the commodity would be available at a future point of time.

Other benefits:

i) Price stabilization: In times of violent fluctuations, future trading reduces the price variations.

ii) Competition: Future trading encourages competition and provides competitive price to farmers, millers or traders.

- iii) **Supply and demand:** It ensures a balance in demand and supply position throughout the year.
- iv) **Integration of price:** Future trading promotes an integrated price structure throughout the country.

8.0 INSTITUTIONAL FACILITIES

8.1 Marketing related schemes of Government / Public Sector:

Name of the scheme/implementing organisation	Facilities provided/salient features/ objectives
1.Agricultural Marketing Information Network Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.	▶ To establish a nationwide information network for speedy collection and dissemination of market data for its efficient and timely utilization. ▶ To ensure flow of regular and reliable data to the producers, traders and consumers to derive maximum advantage out of their sales and purchases. ▶ To increase efficiency in marketing by effective improvement in the existing market information system. ▶ The scheme provided connectivity to 2458 nodes comprising the State Agricultural Marketing Department (SAMD) /Boards/ Markets. These concerned nodes have been provided with one computer and its peripherals. These SAMD/Boards/ Markets are to collect desired market information and pass on to respective state authorities and Head Office of the DMI for forward dissemination. The eligible markets will get 100 percent grant by Ministry of Agriculture.
2.Gramin Bhandaran Yojana (Rural Godowns Scheme) Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.	▶ It is a capital investment subsidy scheme for construction/renovation/expansion of rural godowns. The scheme is implemented by DMI in collaboration with NABARD and NCDC. The objectives of the scheme are to create scientific storage capacity with allied facilities in rural areas to meet the requirements of farmers for storing farm produce, processed farm produce, consumer articles and agricultural inputs. ▶ To prevent distress sale immediately after harvest. ▶ To promote grading, standardization and quality control of agricultural produce to improve their marketability. ▶ To promote pledge financing and marketing credit to strengthen agricultural marketing in the country for the introduction of a

	national system of warehouse receipt in respect of agricultural commodities stored in such godowns. ▶ The entrepreneur will be free to construct godown at any place and of any size except for restrictions that it would be outside the limits of Municipal Corporation area and be of a minimum capacity of 50 MT. ▶ The scheme provides credit linked back-ended capital investment subsidy @25 percent of the project cost with a ceiling of Rs. 37.50 lakh per project. For the projects in North-Eastern states and hilly areas with altitude of more than 1000 m above mean sea level and SC/ST entrepreneurs, maximum subsidy admissible is @33 percent of the project cost, with a ceiling of Rs. 50.00 lakhs.
3.Scheme for development/strengthening of agricultural marketing Infra-structure, grading & standardization Directorate of Marketing and Inspection, Head Office, N.H.-IV, Faridabad.	▶ To provide additional agricultural marketing infra-structure to cope up with the expected marketable surpluses of agricultural and allied commodities including dairy, poultry, fishery, livestock and minor forest produce. ▶ To promote competitive alternative agricultural marketing infrastructure by inducement of private and co-operative sector investments that sustain incentives for quality and enhanced productivity thereby improving farmers' income. ▶ To strengthen existing agricultural marketing infra-structure to enhance efficiency. ▶ To promote direct marketing so as to increase market efficiency through reduction in intermediaries and handling channels thus enhancing farmers' income. ▶ To provide infra-structure facilities for grading, standardization and quality certification of agricultural produce so as to ensure price to the farmers commensurate with the quality of the produce. ▶ To promote grading, standardization and quality certification system for giving a major thrust for promotion of pledge financing and marketing credit, introduction of negotiable warehousing receipt system and promotion of forward and future markets so as to stabilize market system and increase farmers' income. ▶ To promote direct integration of processing units with producers. ▶ To create general awareness and provide education and training to farmers, entrepreneurs and market functionaries on agricultural marketing including grading and quality certification.

4. Agmark grading and standardization Directorate of Marketing & Inspection, Head Office, N.H.-IV, Faridabad.	▶ Promotion of grading of agricultural and allied commodities under Agricultural Produce (Grading & Marking) Act. 1937. ▶ Agmark specifications for agricultural commodities have been framed based on their intrinsic quality. Food safety factors are being incorporated in the standards to compete in the world trade. Standards are being harmonised with international standards keeping in view the WTO requirements. Certification of agricultural commodities is carried out for the benefit of producer and consumer.
5. Price Support Scheme (PSS), National Agricultural Cooperative Marketing Federation of India Limited (NAFED), Nafed House, Sidhartha Enclave, New Delhi-1100014	▶ NAFED is the nodal agency of Government of India to undertake procurement of sunflower under price support scheme. ▶ The objective of scheme is to provide regular marketing support to sustain and improve the production of sunflower. ▶ Purchases under PSS are undertaken when the market price is at or below the declared support prices for a particular year.
6. Co-operative Marketing, processing storage etc. programmes in comparatively under/least developed states, National Co-operative Development Corporation (NCDC), Hauz Khas, New Delhi-110016	▶ To correct regional imbalances and to provide needed momentum to the pace of development of various programmes of co-operative agricultural marketing, processing, storage etc. in under/least developed states/UTs by providing financial assistance on liberal terms to augment the income of farmers and weaker sections of the community. ▶ The scheme provides for distribution of agricultural inputs, development of agro-processing including storage, marketing of food grains and plantation/horticulture crops, development of weaker and tribal sections, cooperatives, dairy, poultry and fisheries.

8.2 Institutional credit facilities:

Institutional credit facilities are the vital factor in agricultural development. The main emphasis is laid down on adequate and timely credit support to the farmers, particularly small and marginal farmers for encouraging adoption of modern technology and improved agricultural practices.

The institutional agriculture credit disbursed through co-operatives was 31 percent, 60 percent through Commercial Banks and 9 percent through Regional Rural Banks during 2003-2004.

The institutional credit to agriculture is offered in the form of short term, medium term and long term credit facilities:

Short term and medium term loans:

Name of scheme	Eligibility	Objective/Facilities
1. Crop Loan	All categories of farmers.	➤ To meet cultivation expenses for various crops as short term loan. ➤ This loan is extended in the form of direct finance to farmers with a repayment period not exceeding 18 months.
2. Produce Marketing Loan (PML)	All categories of farmers.	➤ This loan is given to help farmers to store produce on their own to avoid distress sale. ➤ This loan also facilitates immediate renewal of crop loans for next crop. ➤ The repayment period of the loan does not exceed 6 months.
3. Kisan Credit Card Scheme	All agriculture clients having good track record for the last two years.	➤ This card provides running account facilities to farmers to meet their production credit and contingency needs. ➤ The scheme follows simplified procedures to enable the farmers to avail the crop loans as and when they need. ➤ Minimum credit limit is Rs. 3000/-. Credit limit is based on operational land holding, cropping pattern and scale of finance. ➤ Withdrawals can be made by using easy and convenient withdrawal slips. The Kisan Credit Card is valid for 3 years subject to annual review.

		➤ It also covers personal insurance against death or permanent disability; a maximum amount of Rs. 50,000 and Rs. 25,000 respectively.
4.National Agricultural Insurance Scheme	Scheme is available to all farmers – loanee and non-loanee both-irrespective of the size of their holding.	➤ To provide insurance coverage and financial support to the farmers in the event of failure of any of the notified crops as a result of natural calamities, pests and diseases attack. ➤ To encourage the farmers to adopt progressive farming practices, high value in-puts and higher technology in agriculture. ➤ To stabilize farm incomes, particularly in disaster years. ➤ General Insurance Corporation of India (GIC) is the Implementing Agency. ➤ Sum insured may extend to the value of threshold yield of the area insured. ➤ Coverage of all food crops (cereals, millets and pulses), oilseeds and annual commercial / horticultural crops. ➤ Provides subsidy of 50 percent in premium of small and marginal farmers. The subsidy will be phased out over a period of 5 years on sunset basis.

Long term loans:

Name of scheme	Eligibility	Objective/Facilities
Agricultural Term Loan	All categories of farmers (small/medium and agricultural labourers) are eligible, provided they have necessary experience in the activity and required area.	➤ The banks extend this loan to farmers to create assets facilitating crop production/income generation. ➤ Activities covered under this scheme are land development, minor irrigation, farm mechanization, plantation and horticulture, dairying, poultry, sericulture, dry land / waste land development schemes etc. ➤ This loan is offered in the form of direct finance to farmers with a repayment span not less than 3 years and not exceeding 15 years.

8.3 Organisations / agencies providing marketing services:

Name of the organisation and address	Services provided
1. Directorate of Marketing and Inspection (DMI) NH-IV, CGO Complex Faridabad Website: www.agmarknet.nic.in	➤ To integrate development of marketing of agricultural and allied produce in the country. ➤ Promotion of standardization and grading of agricultural and allied produce. ➤ Market development through regulation, planning and designing of physical markets. ➤ Promotion of cold storage. ➤ Promotion of rural godowns and market infrastructure. ➤ Training of personnel in agricultural marketing. ➤ Undertakes extension and publicity activities to educate producers, traders and consumers. ➤ Providing agricultural marketing information. ➤ Liaison between the Central and State Governments through its regional offices (11) and sub-offices (26) spread all over the country.
2. Agricultural and Processed Food Products Export Development Authority (APEDA) NCUI Building, 3, Siri Institutional Area, August Kranti Marg, New Delhi-110016 Website: www.apeda.com	➤ Development of scheduled agriculture products related industries for export. ➤ Provides financial assistance to these industries for conducting surveys, sensibility studies, relief and subsidy schemes. ➤ Registration of exporters for scheduled products. ➤ Adapting standards and specifications for the purpose of export of scheduled products. ➤ Carrying out inspection of meat and meat products for ensuring the quality of such products. ➤ Improving the packaging of the scheduled products. ➤ Promotion of export oriented production and development of scheduled products. ➤ Collection and publication of statistics for improving marketing of scheduled products. ➤ Training in the various aspects of industries related to the scheduled products.

3.National Agricultural Cooperative Marketing Federation of India Limited (NAFED), Nafed House, Sidhartha Enclave, New Delhi – 110014 Website: www.nafed-india.com	➤ Central nodal agency of Government of India for procurement of oilseeds under price support scheme. ➤ Coordinate and promote the marketing and trading activities of its affiliated co-operative organizations. ➤ Provide storage facilities. ➤ Consumer Marketing Division of NAFED serves the consumers in Delhi through the network of its retail outlets (NAFED BAZAR).
4.Central Warehousing Corporation (CWC), 4/1 Siri Institutional Area, Opp. Siri fort New Delhi -110016 Website : www.fieo.com/cwc/	➤ Provides scientific storage and handling facilities. ➤ Offers consultancy services / training for the construction of warehousing infrastructure to different agencies. ➤ Import and export warehousing facilities. ➤ Provides disinfection services.
5.National Co-operative Development Corporation (NCDC), 4, Siri Institutional Area, New Delhi-110016 Website: www.ncdc.nic.in	➤ Planning, promoting and financing programmes for production, processing, marketing, storage, export and import of agricultural produce. ➤ Financial support to Primary, Regional, State and National level marketing societies is provided towards; i) Margin money and working capital finance to augment business operations of agricultural produce. ii) Strengthening the share capital base, and iii) Purchase of transport vehicles.
6.Director General of Foreign Trade (DGFT), Udyog Bhavan, New Delhi. Website: www.nic.in/eximpol	➤ Provides guidelines / procedure of export and import of different commodities. ➤ Allot import-export code number (IEC No) to the exporter of agricultural commodities.
7.National Dairy Development Board (N.D.D.B.), Anand-388 001 Gujarat Website:	➤ Initiated the “Restructuring Edible Oil and Oilseeds Production and Marketing Project”. ➤ Motivates farmers’ investment in oilseeds sector through farmer owned co-operatives. ➤ Capacity creation to crush oilseeds, solvent extracts, oilcake and refine edible oil.

www.nddb.org	➤ Establishes storage capacity for storage of oilseeds and oil.
8. Directorate of Oilseeds Research (DOR), Rajendranagar, Hyderabad-500030 (A.P.) Website: www.dor-icar.org	➤ National organization under crop science division of Indian Council of Agricultural Research (ICAR) to plan, coordinate and execute the research programmes to augment the production and productivity of oilseeds including sunflower. ➤ Transfer of technology. ➤ Provide training. ➤ Provide consultancy services. ➤ Coordination of multi-location research to develop varieties through All India Coordinated Research Programme.
9. State Agricultural Marketing Board (SAMBs),	➤ Implementation of the regulation of marketing of agricultural and allied commodities in the state. ➤ Provide infrastructural facilities for the marketing of notified agricultural produce. ➤ Grading of agricultural produce in the markets. ➤ To co-ordinate all the market committees for information services. ➤ Provide aid to financially weak or needy market committees in the form of loans and grants. ➤ To eliminate malpractices in the marketing system. ➤ To arrange or organise seminars, workshops or exhibitions on subjects relating to agricultural marketing.

9.0 UTILIZATION

9.1 Processing:

Processing or, oil extraction means separation of oil from rest of the materials. Oil extraction in India is mainly done by two methods:

A) Mechanical method (Seed crushing)

- i) Village Ghanies
- ii) Rotaries
- iii) Expellers

B) Chemical method (Solvent extraction)

A) Mechanical method (Seed crushing):

i) Village Ghanies:



VILLAGE GHANI

Seed crushing for extraction of oil is generally done in conventional village Ghanies in villages. The application of pressure effects the oil expulsion from the oilseeds in a Ghani. The original powered Ghani consists of a wooden mortar and a pestle. The mortar is fixed to the ground while, the pestle is rotated by bullock going around in a circle. The seeds get crushed by the generated friction or, pressure. The oil moves out through an opening at the bottom and the cake is scooped out from the top in the mortar. These ghanies are not very efficient extractor.

ii) Rotaries or power operated ghanies:

Rotaries are power operated ghanies and are popular where the electricity is available. The extraction through Rotary mills is better than village ghanies.

iii) Expellers (Continuous screw press):

Expeller processing is the most widely used method of oil recovery in India. A screw press consists basically of worm assembly, a shaft fitted with spirally arranged worm sections, rather like a screw. The shaft turns horizontally in a cage consisting of barrel bars that are clamped together forming a kind of slotted tube around the shaft. While rotating the worm assembly moves the Sunflower seeds from the feed end to the discharge end expelling the oil thorough the slots between the bars of the cage. The sunflower seed, as it moves along the shaft, loses oil and its volume decreases. The cake is expelled from the press through a choke gear, an adjustable cone forming an annular opening of variable size.

The main advantages of screw presses are:

- (i) Low capital cost,
- (ii) (ii) No danger of fire from combustible solvent as in solvent extraction plants, and

- (iii) They can be operated by less number of skilled staff.

The disadvantages are:

- i) The oil recovery is not complete, and
- ii) High maintenance and operating costs.

B) Chemical method (Solvent extraction):

This is the most modern method. Extraction of the oil from the seed by dissolving it in a solvent (eg:Hexane) is the only method to achieve an almost complete recovery of the oil from oilseeds. The cake left behind is almost free from oil and is rich in protein and fibre.

A solvent extraction plant mainly consists of an extractor, in which oilseed and solvent come into contact, and the solvent removal parts from the cake as well as the solvent oil mixture. The oil is freed from the solvent in a series of distills and stripping columns with associated condensers. The oil is cooled and filtered for further storage.

Advantages:

- i) Very efficient.
- ii) Complete recovery of the oil.
- iii) Solvent extraction industry is complimentary to seed crushing industry as it recovers a major portion of oil left in oilcake.
- iv) Shelf life of the oil is much more than the oil extracted by mechanical method.

Disadvantages:

- i) High investment cost.
- ii) Required trained worker.

REFINING OF THE OIL:

The purpose of refining is to produce a bland-tasting, light coloured oil without odour or flavour. To obtain a fully refined oil from a crude oil, the following steps are necessary:

(a) Degumming,(b) Neutralization,(c) Bleaching, (d) Winterization and (e) Deodorization

Degumming is the removal of non-oil constituents from crude oil and is the first step in the refining of oil. Neutralizing means the removal of the free fatty acids contained in the crude oil. This is done by treating the oil with a caustic soda solution, which forms soap with the fatty acids. The soap stocks produced contains some oil, which is a refining loss.

Degumming, neutralization and sometimes, winterization (removal of solid fat by cooling from the oil) may be combined in one operation. Bleaching (removal of colour) is carried out by mixing the neutralized oil with activated carbon or bleaching earth. Winterization may follow the bleaching. Deodorizing is the final step which involves steaming of the oil under vacuum at high temperatures. This step removes volatile, odoriferous substances from the oil by distillation. The finished product (refined oil) is packed into various types of containers for supply to the consumers.

9.2 Uses:

Almost every part of the sunflower is used by human being in one way or another; it is the oil that is most valuable. The main uses of sunflower are as follows:

Edible oil: Used as cooking oil. Also used as salad oil, salad dressings, vegetable shortenings, margarine. Sunflower seed oil also has several important industrial uses as a drying agent used in paints, resins, plastics, soaps, cosmetics.

Animal feed: Sunflower is very high in protein and is an important feed ingredient for livestock and poultry, particularly beef cattle and calves.

Hull: A byproduct from processing (particularly confectionary seeds). Hull of sunflower is high-energy content. Generally, ground and pelleted and used as an animal feed ingredient for beef cattle, poultry, dairy cattle. Hull is also used in industrial products like fertilizer, fiberboard. Hulls are used for fuel also.

Bird feed: Sunflower seeds, particularly the black, oil-type, are also the favourite of most seed-eating birds. A well-known use of sunflower seed in the United States is for bird feed. The high oil content of sunflower seeds provides an excellent source of energy for birds.

Functional food: Sunflower seeds are used as a functional food (Certain food that provides health benefit beyond basic nutrition and reduce the risk of disease or other health concerns are known as functional food). Use of sunflower products is seen a big improvement in the overall nutritional quality of diet.

Sunflower kernels: Sunflower seed is consumed as a snack food called confectionery sunflower. Kernel is used in a broad array of snack and food product. Hulled sunflower or, kernels are used in a wide variety of food products such as an ingredient in bread or in grain mixes of nuts and dried fruit

Medicinal: Sunflower seeds have diuretic and expectorant properties and are beneficial in the treatment of bronchial, laryngeal and pulmonary affections. Eating sunflower seeds reduces cavities in teeth, stops pink toothbrush, aids quivering eyes, improves the eye, and ameliorates the condition of the skin. The sunflower removes the unpleasant coating on the tongue, is good for nerves, relieves soreness in the muscles, and eliminates that tired feeling.

Ornamental plants: Sunflower in backyard gardens is grown as ornamental purposes and to attract birds to the garden.



Silage: Sunflowers are used as silage. When sunflower seeds do not have sufficient time to mature or, when crops have considerable damage or loss due to insects, diseases, hail storm, drought or, frost a sunflower crop is harvested and used as silage.

Flowers: The sunflower is a source of some pigments. Yellow dye was extracted from the ray flowers. Sunflower is a source of nectar and pollen for honey bees and yield useful honey. Besides yielding honey, the bee activity enhances sunflower seed yield through increasing pollination, seed setting, seed weight and oil content.

Litter: Dry stems, leaves and seedless heads are used as litter for laying houses.

As vegetable: The unexpanded buds boiled and served like Artichokes form a pleasant dish.

As fuel: Sunflower stalks and empty seed-heads are used as fuel. Ash obtained after burning dry stems is rich in potash, a valuable manure.

10.0 DO'S AND DON'TS

DO'S	DON'TS
✓ Harvest the crop at proper time of maturity, when the back of the head turns from green to lemon yellow colour and the bottom leaves starts drying and withering.	✗ Delay in harvesting beyond maturity causes reduction in seed yield due to lodging of plants and higher bird damage.
✓ Harvest the sunflower when 10 percent of heads turned brown and florets attached to the tip of the seeds drop off naturally.	✗ Harvest before attaining physiological maturity.
✓ Use chemical defoliation or, dessication using DIQUAT, magnesium chlorate or, dipyrldyl phosphate to accelerate drying of standing crops.	✗ Wait for natural drying of standing crops as it delays harvesting.
✓ Harvest during conducive weather condition.	✗ Harvest the crop during adverse weather condition (during rain and over cast weather).
✓ Use mechanical thresher to separate seed from flower which is labour saving and economical.	✗ Practice manual threshing as it is not economical.
✓ Sunflower cultivation should be done in large continuous blocks and use bird scaring like tying of bright reflector ribbons above the crop to avoid damage by birds.	✗ Cultivate sunflower in isolated areas as birds damage the crop heavily.
✓ Market the sunflower after AGMARK grading to get remunerative prices in the market.	✗ Market sunflower without grading.
✓ Before marketing the produce, get the market information regularly from www.agmarknet.nic.in website, newspapers, T.V., radio, concerned APMC offices etc.	✗ Market produce without collecting / verifying marketing information.
✓ Store the sunflower during post-harvest period and sell it later when the prices are higher in the market.	✗ Sell the sunflower during post-harvest period when the prices are low.

✓ Use proper and scientific method of storage.	✗ Use conventional and outdated method of storage, which causes higher storage losses.
✓ Maintain the seed moisture content between 5-8% for safe storage.	✗ Store sunflower seed having higher moisture content, which leads insect-pests infestation.
✓ Avail the benefit of centrally sponsored GRAMIN BHANDARAN YOJANA scheme for construction of rural godowns and store sunflower.	✗ Store sunflower at unscientific place in a haphazard manner.
✓ Select the shortest and efficient marketing channel to get highest share in marketing.	✗ Use the long marketing channel, which reduces the producer's share.
✓ Package properly to protect the quality and quantity of produce during transit and storage.	✗ Pack in improper package which causes more losses during transit and storage.
✓ Select the cheaper and convenient mode of transportation.	✗ Use the costly mode of transport.
✓ Use improved post-harvest technology and processing techniques to avoid post-harvest losses.	✗ Use conventional techniques in post-harvest operations and in processing.
✓ Adopt the procedure of Sanitary and Phyto-Sanitary measures during export.	✗ Export without any Sanitary and Phyto-Sanitary measures.
✓ To assure better marketing of the produce, avail benefit of contract farming.	✗ Produce sunflower without assessing and assuring its market demand for that year.
✓ Avail the benefits of future trading to avoid price risk arising due to wide fluctuations in commodity prices.	✗ Sell the produce at fluctuating prices or in glut situation.

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